

PERSONAL COMPUTING

Canada &
International
\$3.50

**“You bet I bought
a second
computer”**

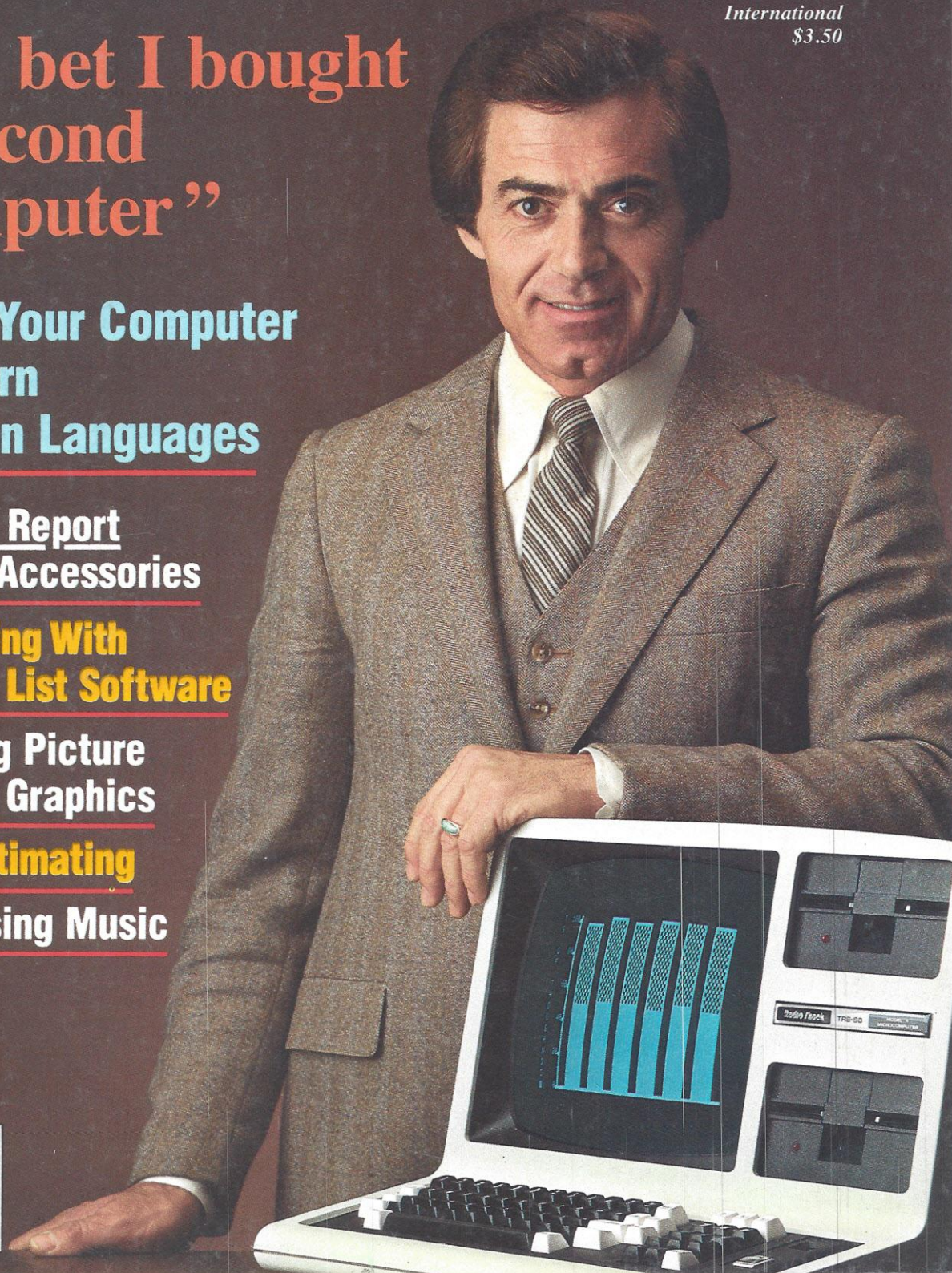
**Using Your Computer
To Learn
Foreign Languages**

**Special Report
Printer Accessories**

**Marketing With
Mailing List Software**

**Creating Picture
Perfect Graphics**

**Cost Estimating
Composing Music**



You come first.

With NEC's PC-8800 personal computer, you don't have to ask yourself which comes first, the hardware or the software.

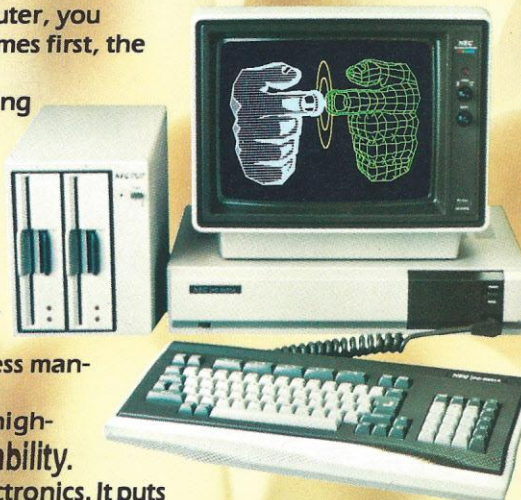
It's designed to be uncompromising in both areas. So you come first. In the office or at home.

The hardware lets you select from NEC's state-of-the-art processors, disk drives, printers, and monitors.

The software includes advanced, user-friendly programs for all types of banking, accounting, and business management.

You come first again with NEC's high-quality graphics and ultra-high reliability.

The PC-8800 from NEC Home Electronics. It puts you first. So you can break out of your shell and grow.



Your choice of hardware:

- 8-bit or 16-bit processor
- 5¼" or 8" disk drive
- High-speed dot matrix or letter-quality printer

Free software with complete system:

- WordStar® word processing
- MailMerge®
- Multiplan™ spread sheet
- BASIC (two versions)
- CP/M®

NEC

NEC Home Electronics (U.S.A), Inc.
Personal Computer Division
1401 Estes Avenue

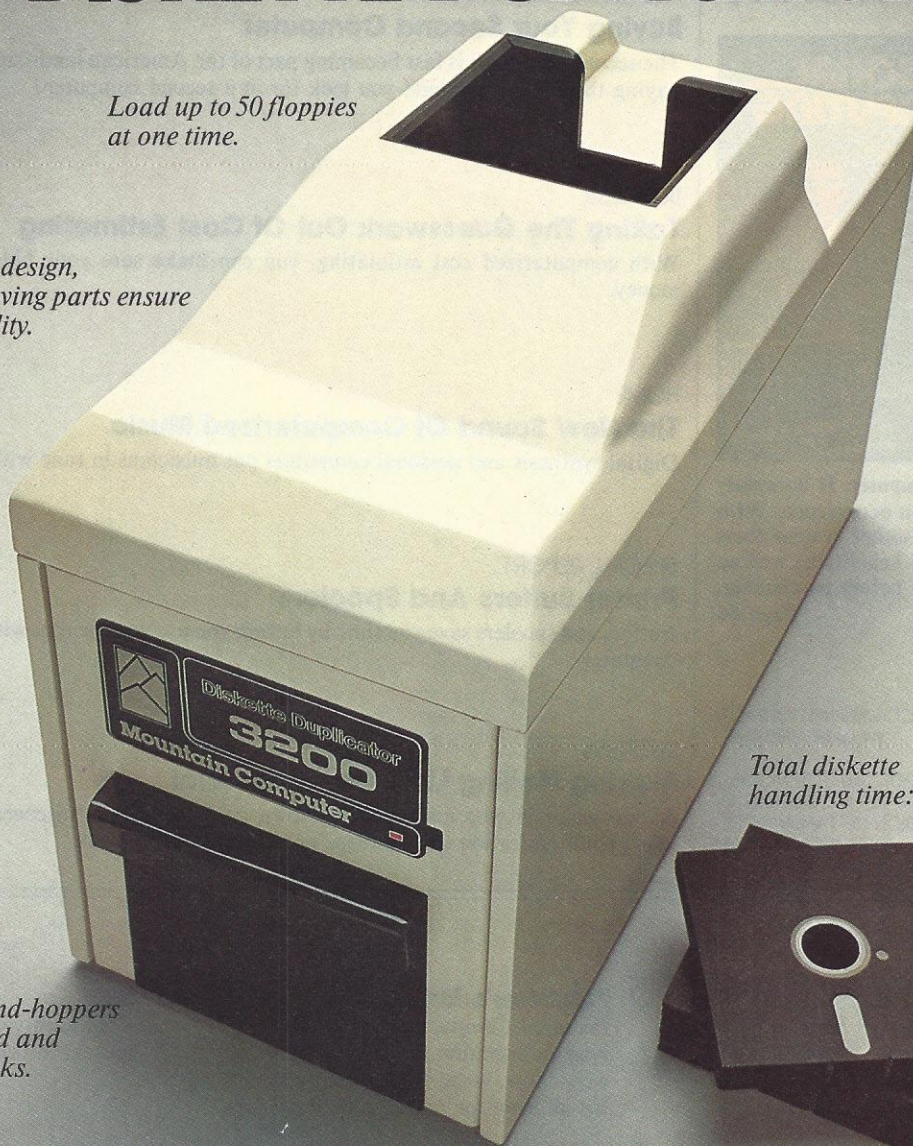
Elk Grove Village, IL 60007 CIRCLE 1

NEC Corporation, Tokyo, Japan

COPY YOUR FLOPPIES AUTOMATICALLY FOR ONLY \$4995. THE NEW MOUNTAIN DISKETTE DUPLICATOR.

*Load up to 50 floppies
at one time.*

*Sturdy design,
few moving parts ensure
reliability.*



*Total diskette
handling time: 3 seconds.*

*Separate end-hoppers
for accepted and
rejected disks.*

New from Mountain Computer – the incredibly low-priced 3200 Diskette Duplicator lets you copy diskettes automatically.

All you need do is to load the 3200 with up to 50 5 1/4" floppy diskettes and connect it to your personal computer. The diskette load, unload, and sort cycle is only 3 seconds.

Your diskettes are protected by the gentle handling of the

3200's positive precision loader control. An automatic shut-off feature turns the duplicator off should a warped or misloaded diskette cause a jam.

The 3200 copies the diskettes from an unprotected master diskette, from data in RAM, or from a Mountain Computer hard disk system for mass program storage applications such as cataloging or master files.

Best of all, the 3200 boasts

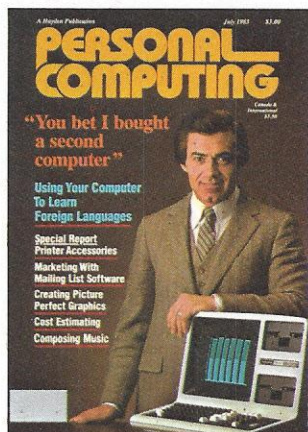
a simple design with a minimum of moving parts to guarantee sturdiness and reliability – and all of this at an industry-low price of only \$4995.

For more information call or write David Doane at Mountain Computer Inc., 300 El Pueblo Road, Scotts Valley, CA 95066, Tel. (408) 438-6650.



MOUNTAIN COMPUTER
Incorporated

FEATURES



Buying a second computer. It is rapidly becoming a common occurrence. With the purchase of another system come additional computing benefits as well as questions to answer before purchasing.
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COVER PHOTOGRAPHY
WILLIAM ARBOGAST

THE TRS-80 MICROCOMPUTER MODEL 4
FEATURED ON THE COVER IS COURTESY OF
RADIO SHACK, A DIVISION OF TANDY CORP.,
FORT WORTH, TEXAS

PROFESSIONAL/MANAGERIAL

Buying Your Second Computer

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The second computer is fast becoming part of the American landscape. Why are people buying them? What should you look for in a second computer?

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HOME

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As businessmen who maintain their own mailing lists are discovering, precisely targeted communication can increase productivity and profits.

DEPARTMENTS

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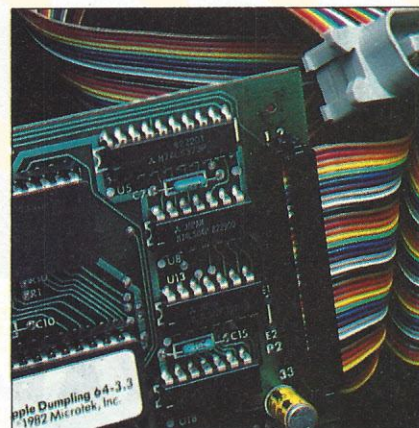
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ESSAY

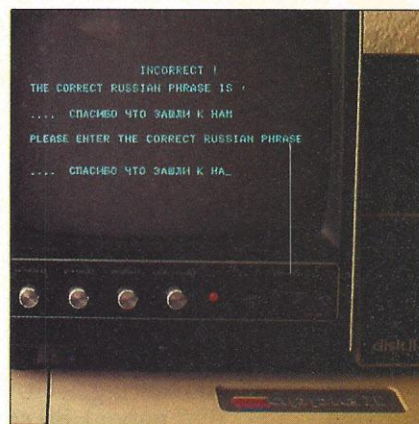
The Chip At 35

This year marks the 35th anniversary of the invention of the transistor, forerunner of the microchip and herald of the new computer age.

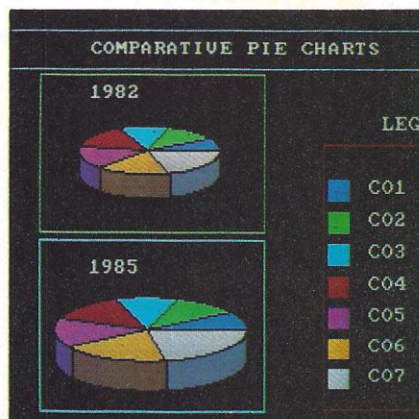
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199 Software Of The Month

Microsoft's Multi-Tool Word allows the use of a mouse; new educational games from Sierra On-Line

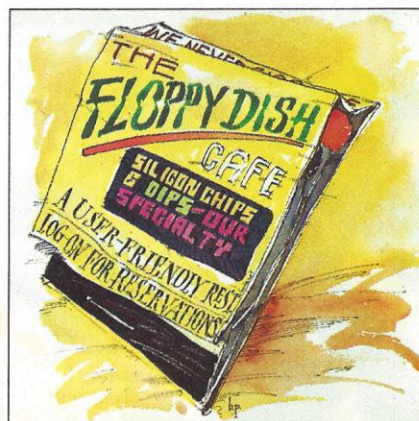
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BUY A BANANA.™ SAVE A BUNCH.

Meet the Banana,™ the very tough, versatile, portable, and reliable dot-matrix printer from Gorilla.™

At \$249.95 retail it's an ideal and inexpensive companion for personal computers like Apple® (or Apple "look alikes" such as Franklin® or Albert®), TI®, Commodore®, TRS-80®, Kaypro®, Timex®, Osborne®, etc.

After that, it's merely comparable to other printers that can cost up to three times as much: 10" carriages (to handle standard 9½" paper), 80 columns, graphics capability, 10 characters per inch (expandable to 5 cpi) draft-quality print (for perfectly acceptable form letters, data processing,

business reports, etc.) tractor feed (for precise alignment and quick loading), parallel or serial interface (take your pick), self-inking ribbon cassette (for long life and easy installation), 10 portable pounds in weight, and compatibility with so many of the most popular personal computers on the market.

Plus its printhead features a unique single-hammer design that eliminates a lot of moving parts, to eliminate a lot of annoying repairs.

That's the Banana: silly name, serious service. It's everything the expensive dot-matrix printers are . . .

Except expensive.



CIRCLE 3

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Finding New Ways To Serve You

When we took over the reins of *Personal Computing Magazine* back in January 1981 we made two very important promises to our readers. The first was that we would do everything in our power to identify your personal computing needs. The second was that we would serve those needs very, very well.

It was the proverbial cold day when we started, and there were plenty of people who said it would be an even colder day before we'd be able to keep the promises we were making.

We doubted the doubters and got on with the job. The result? In two years, *Personal Computing Magazine* has become a success story unequalled in the history of magazine publishing—which is the bottom line as to whether or not we are really communicating with you.

Some months ago, you began to communicate another important need. You were responding more positively to those issues of *Personal Computing Magazine* which featured personal software on the cover. Your letters asked us for more product listings, and more feature stories on personal software. Your response to our surveys told us you wanted to know more about what personal software packages were available. But at the same time, we discovered you were still depending on us to tell you more and more about the act of computing, about what else you could do with your computer, and about the impact of computing on your day-to-day existence.

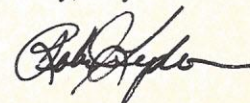
That gave us something to think about. We were confident we could continue to fill your need to know what else you could do with your computer, and we knew filling that need was not inconsistent with filling this new and growing need for more information on personal software. The question was: Could we do it within the pages of one magazine?

We determined that in order to fill both those needs equally effectively, a new kind of effort would be required on our part. At that point, having identified the need, we got on with the job.

Now, nine months later, we are proud to announce the launch of a new publication designed to give you the information you've told us you want on personal software packages. We've named it, appropriately enough, *Personal Software Magazine*. The first issue will be on the newsstand in September, and beginning with the December issue (on sale November 10), it will appear monthly.

Every month, *Personal Software Magazine* will feature some 25 reviews of the best selling software packages. We say reviews, and so they are, but they are also much more than the name implies. In fact, they are carefully constructed "demo runs," a chance for you to "test drive" the package, to get a feel for how it handles in the sharp corners as well as flat out. *Personal Software* will give you monthly listings of all the new software along with information on price, which machines each package runs on, and any additional hardware that might be required. Each issue will offer three buyer's guides—side-by-side listings of specific categories of personal software for you to browse through before you make a purchase decision.

Personal Software Magazine represents our continuing commitment to maintaining a unique communications interface with you, the reader. It is one more avenue for us all to talk together about your needs and the ways in which we can continue to make good on the promise we made you two years ago—to serve our readers very, very well.



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How you can tell



They're both IBM Personal Computers. And they're the same. Only different.

The system that's on the left is the ideal solution for a person who wants to be creative, efficient and improve his or her personal productivity.

So is the other one.

The system on the left incorporates the quality, the reliability and the technological excellence that have made IBM a computer leader for over 30 years.

So does the other one.

So which is which? Simple.

On the left is the IBM Personal Computer, starting with 64KB of user memory (expandable to 640KB) and two optional 5¼" diskette drives.

It can easily satisfy your computing needs at the office, at home or in school.

With 5 expansion slots, it gives you room to grow. (You can even make it function like the computer shown on the right by adding an expansion unit that houses one or two 10-million-character fixed disk drives.)

This system can run most of the same software and accept most of the same IBM hardware as the computer on the right. And its price/performance is nothing less than remarkable.

The IBM Personal Computer

which is which.

On the right is the IBM Personal Computer XT, starting with 128KB of user memory (expandable to 640KB), a 5¼" 360KB diskette drive *plus* a standard 10-million-character fixed disk drive that's *already* built in.

For a businessperson with heavyweight data requirements, the XT packs a lot of power, because it can store the facts, figures, names and numbers you need to know.

(Instead of going from diskette to diskette, you can have up to 5,000 pages of text or up to 100,000 names and addresses conveniently stored in one place.)

And by adding an expansion unit with a *second* 10-megabyte fixed disk drive, you get even more high-volume capacity from the system. XT can run most of the same software and accept most of the same IBM hardware as the computer on the left. And its price/performance is nothing less than remarkable.

But for you to choose, there's a lot left (or right) to learn about both members of this growing family. Visit your authorized IBM Personal Computer dealer. To learn where, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

And see which tool for modern times is right (or left) for you. **IBM®**



The IBM Personal Computer XT

Effortless Communication



"Modem and software \$389, cane and bowler hat not included."

PC Modem Plus & IBM Personal Computer

Effortless The PC Modem Plus™ system contains everything you need to communicate with the IBM Personal Computer—modem, communications software, telephone cable and complete instructions.

Modem The modem card fits inside the PC, connects directly to the phone line and includes an additional IBM-compatible asynchronous port. The full duplex, auto-answer/auto-dial, 300 baud modem can tone or pulse dial and is compatible with most

other communications software packages. Full duplex 1200 baud (212) operation is available with the addition of Ven-Tel's PC Modem Plus Speed Adapter.™

Software The full featured communications software has auto-logon and data capturing ability. You can store information from Dow Jones News/Retrieval™ or other sources on disk, exchange information with mainframes, minis or personal computers and transfer files to other Crosstalk™-compatible systems.

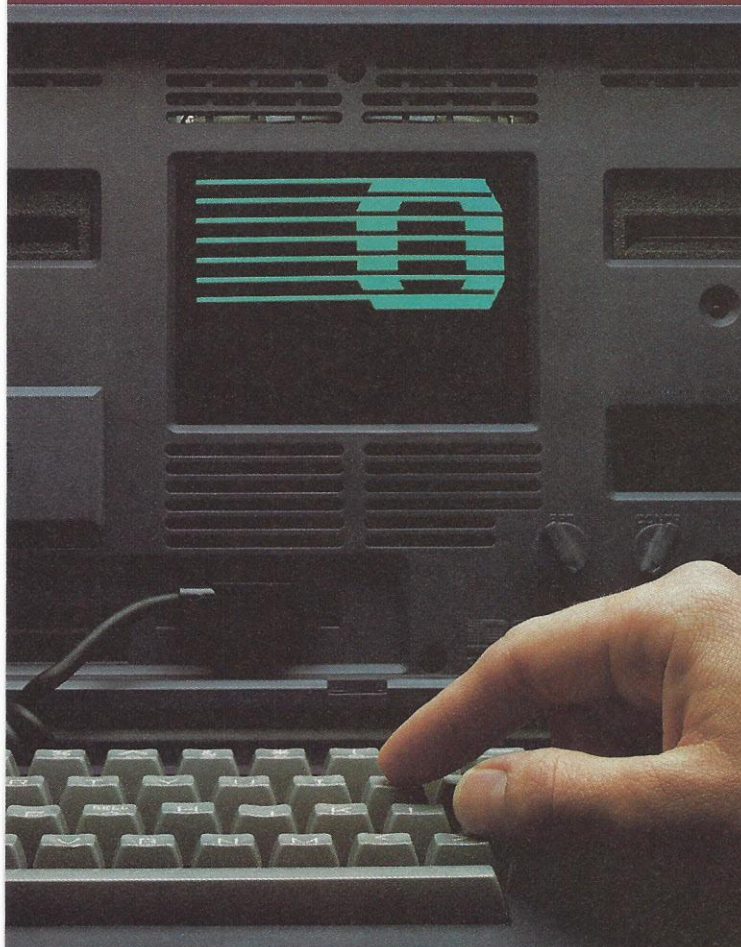
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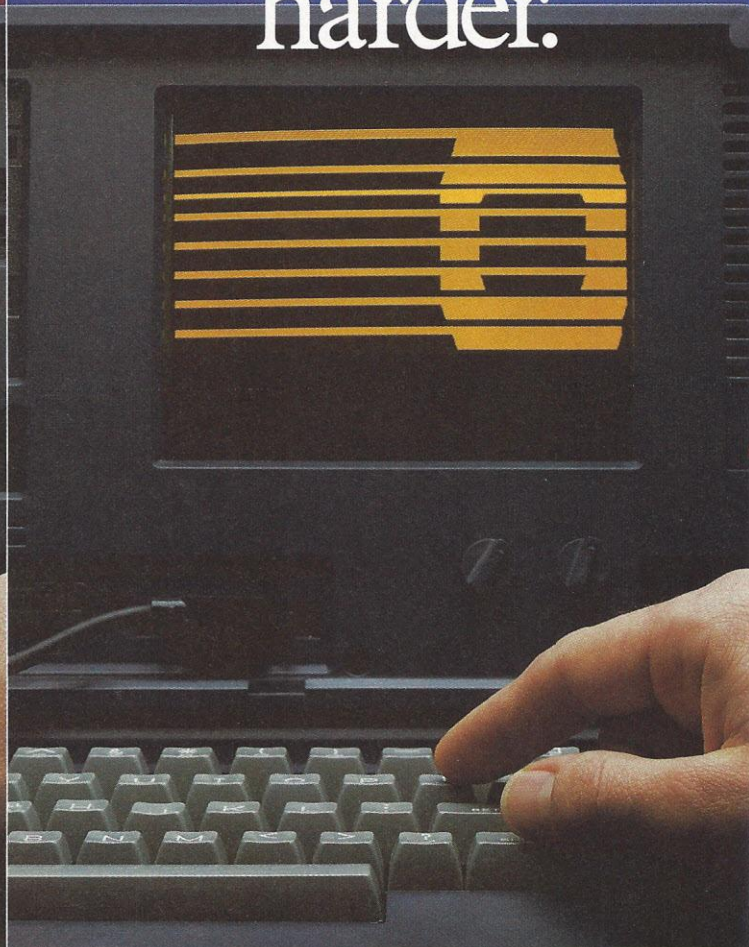
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We listened.



We listened harder.



Introducing the new Osborne™ Executive™ Series.

We listened when you told us you wanted a personal business computer.

We delivered the Osborne 1.

And in the two years since its introduction, the Osborne 1 has become the largest selling portable business computer on earth.

We listened harder.

The result is the new Osborne Executive Series. Consider these new advantages:

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Emulation provides access to information stored on other computers. □ IBM Personal Computer™ compatibility (on the Executive 2) lets you use software packages designed for the IBM system.

And there's much more.

Add up the value of all the hardware features and software systems included with either the Executive or Executive 2 and you will see that the sticker price is one of the incredible bargains available in personal computing.

Visit your local authorized Osborne dealer. Once again, Osborne has set the standard for portable business computers.

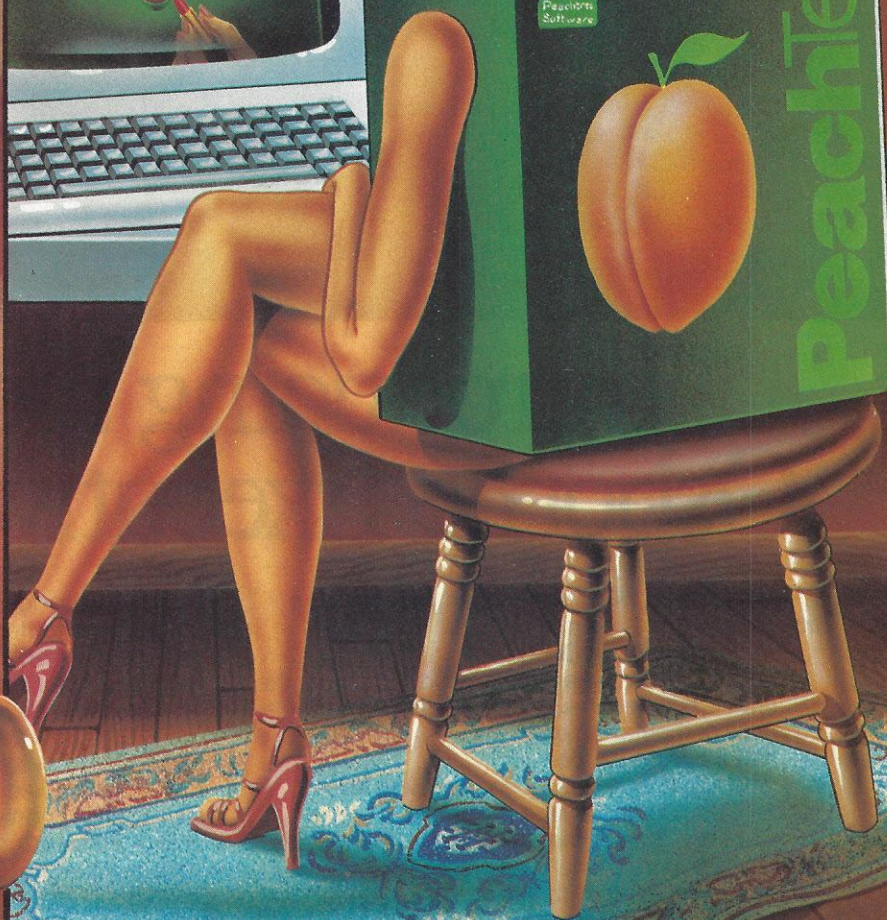
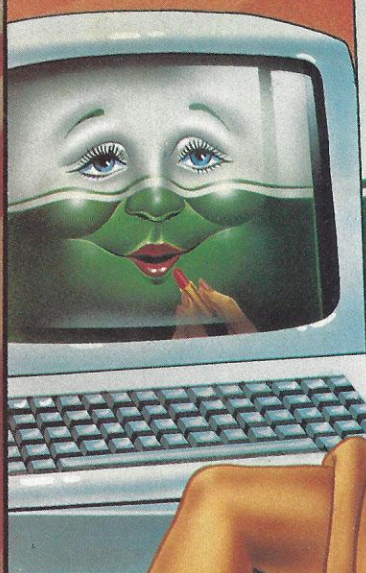
For the name of your nearest Osborne dealer, dial (800) 772-3545 ext. 905 (in California); (800) 227-1617 ext. 905 (outside California).

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OSBORNE
COMPUTER CORPORATION
CIRCLE 6



PeachText
5000



1998

PeachText 5000™

In a word, a star is born.

PeachText 5000™ has arrived. A complete personal productivity system for word processing, financial modeling, mailing lists and simple data-base management. All at one price—\$395.00. And all from Peachtree Software Incorporated.

The quality is unmistakably Peachtree: proven, powerful applications with menu-driven features, easy-to-use documentation and quick access to "Help" prompts. And they're fully interactive.

PeachText 5000 is available for the IBM Personal Computer,™ the COMPAQ Portable Computer,™ the Texas Instruments Professional Computer™ and the Zenith Z-100.

The PeachText 5000 Personal Productivity System includes:

1 Word processing

PeachText™ word processor. PeachText has long been recognized as one of the best in the industry, with sophisticated print capabilities second to none and complete editing capabilities for creating and manipulating a variety of documents. We've made it even better for PeachText 5000.

We've even installed the Random House Electronic Thesaurus™ in PeachText.

Spelling Proofreader. This high-performance package can check a 10,000-word document for spelling and typographical errors in less than two minutes.*

2 Financial planning

Turn your computer's memory into a worksheet for financial and other mathematical analysis. PeachCalc™ will address up to 256K of RAM, so you don't have to worry about your memory space outstripping PeachCalc's capacity. Combine spreadsheets with PeachCalc's merge functions or insert PeachCalc reports

into PeachText documents. You can even use the "Execute" command to set up material from PeachText or other files to be fed into PeachCalc.

3 Data management

List Manager. This module uses Peachtree's state-of-the-art screen manager and index file manager to give you complete control over the design and use of mailing lists, labels and other files or reference aids. Output can be used with the PeachText word processor to individualize form letters or template documents.

Limited Time Introductory Offer

Now PeachText 5000 is available for \$395.00. That's right—just \$395.00.

And that's not all. With your PeachText 5000 package you will receive:

A free box of 10 Peachtree/Wabash 5¼" diskettes to hold the fruits of your new Peachtree productivity.

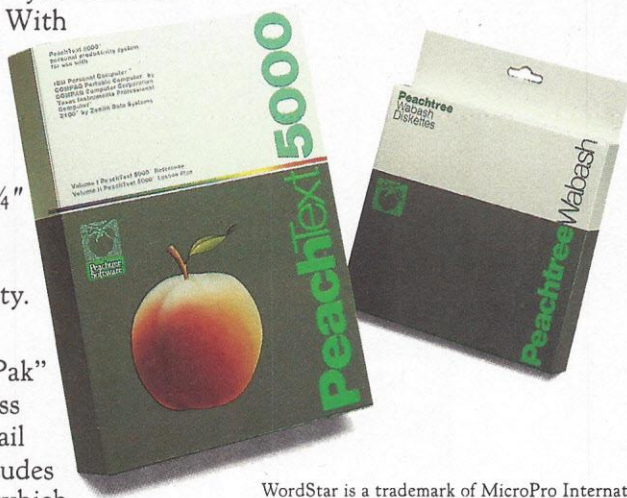
A coupon to get Peachtree's "Access Pak" for \$10.00. The Access Pak, which has a retail value of \$525.00, includes Information Access, which allows you to extract information from Peachtree accounting products for use with PeachText

5000 applications. And you get file converter programs to make existing WordStar®, Easy Writer™ and VisiCalc™ files usable with PeachText 5000—because you shouldn't have to suffer because you've waited this long for the complete personal productivity system.

Free 30-day support from Peachtree Software Incorporated, on return of the registration card.

PeachText 5000 is here. The complete personal productivity system. And it's unmistakably Peachtree.

*In actual trials using an IBM Personal Computer and 320K diskettes, Spelling Proofreader checked a 10,024-word document in one minute and 15 seconds, using the standard 20,000-word dictionary supplied with the package. Checking times may vary depending on your hardware.



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Unmistakably Peachtree



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CIRCLE 53

modem

**Presenting
the computer America
is flipping over.**

Some computers have a vertical format for word processing. Still others offer a horizontal format for spread sheets.

The Corvus Concept™ gives you both. All in a single unit. By simply flipping the screen.

Whole-page word processing and 13-column one-glance forecasting. No need for scrolling. And no need to resort to a printer.

The Seybold Office Systems Report (June 1982) called it "The most impressive new desk-top computer" at the 1982 Hannover Fair. Byte Magazine (June 1982) said "It will set the price/performance standard in its price class for some time to come."

Besides its dual orientation screen, the Concept has set the pace in memory

capacity with 256 thousand bytes (expandable to 512 kilobytes).

And it's designed to grow with your needs. Every Concept has a built-in network interface that transforms it from a powerful stand-alone computer to a versatile, multi-function workstation on an interactive peripheral-sharing network.

Because it was an idea whose time had come, we called it the Corvus Concept.

You'll call it a miracle.

★★ **CORVUS SYSTEMS**

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Sources Of Bulletin Board Software

In this monthly column "Answers" we will respond to your most frequently asked general questions about personal computing. Please send your questions to: Answers, Personal Computing, 50 Essex St., Rochelle Park, NJ 07662.

Q: In your June 1983 article "Electronic Bulletin Boards," page 64, you went to great trouble to explain the ins and outs of these bulletin boards. However, you didn't publish a comprehensive list of available software programs. Where can I get one?

A: Some of the best are listed and reviewed in the quarterly newsletter *The On-Line Computer Telephone Directory* (write P.O. Box 10005, Kansas City, MO 64111; subscription price \$9.95 a year, \$15.95 for two years). Below are some of the most popular sources listed in the directory:

ABBS 4.0 for Apple II computer. Software Sorcery, 7927 Jones Branch Drive, Suite 400, McLean, VA 22102, or any authorized Apple computer dealer.

ACCESS for the Apple II Plus computer. Information Intelligence Inc., P.O. Box 31098, Phoenix, AZ 85046. (602) 996-2283—\$750.

AMIS for the Atari 800 computer. A public-domain program developed by the Michigan Atari Computer Enthusiasts (MACE). Available for \$5 on buyer-supplied disk or \$10 on new disk from GRAFex Company, Box 1558, Cupertino, CA 95015. (408) 996-2689. CompuServe ID# 70371,146.

Bullet-80 for the TRS-80 Model I and Model III computers. Computer Services of Danbury, 1 Franklin Street,

P.O. Box 993, Danbury, CT 06810. Cost—Model I(7.1) \$13; Model III (7.1) \$150.

CBBS for CP/M-based systems. Randy Suess, CBBS, 5219 W. Warwick, Chicago, IL 60641. Cost—\$50. More information is available in message 11 of CBBS Chicago (312) 545-8086.

CommuniTree—First Edition for the Apple II. Network, Inc., Box 2246, Dept. TC, Berkeley, CA 94702. (415) 849-2665.

Connection-80 for the TRS-80 Model I. B.T. Enterprises, 171 Hawkins Road, Centereach, N.Y. 11720. Cost—\$199.95.

CP/M for CP/M-based systems. This public-domain software package is available in the CP/M users group library. Some software patching may be necessary to make it run on any particular hardware configurations.

Forum-80 for the TRS-80 Model I and Model III. Cost—\$350 for complete system, manuals, and user's guide. Small Business Systems Group, 6 Carlisle Road, Westford, MA 01866; authorized Small Business Systems Group dealers and Forum-80 Headquarters, 7600 E. 48th Terr., Kansas City, MO 64129. Write for more information.

HOSTCOMM for the IBM Personal Computer (128k). N.F. Systems Ltd., P.O. Box 76363, Atlanta, GA 30358. Cost—\$170 for basic package; \$80 for electronic mail module. Modem number (404) 252-4146 (3p.m.-8a.m. EST).

Net-Works for the Apple II and Franklin computers. Distributed by High Technology. See your local computer dealer to order or write to: Nick Naimo, 4877 Martin Road, Newburgh, IN 47630. Price structure may change slightly, but last

prices were: new version—\$89.95, updates of older versions—\$22.50 with proof of purchase.

PC BBS for the IBM Personal Computer (64k). 5900 Canterbury Drive, Suite 8-219, Culver City, CA 90230. Cost—\$75 for complete system.

Remote North Star Bulletin Board for North Star or CP/M with either Microsoft BASIC or Micro Mikes BAZIC. Available from The Micro-Stuf Company, P.O. Box 33337, Decatur, GA 30033. (404) 491-3787. Write or call for complete information.

Peoples Message System (PMS) for the Apple II. Datel Systems Inc., P.O. Box 817, Lakeside, CA 92040. (619) 443-6616. Cost—\$300.

ST80-X10 host program for the TRS-80 Model I and Model III (\$50). **ST80-PBB** personal bulletin board system for the TRS-80 Model I and Model III (\$30/tape, \$40/disk). **ST80-CC** electronic mail system for the TRS-80 Model I and Model III (\$99). **MOUSE-NET** bulletin-board system for the TRS-80 Model I and Model III (\$299). All by Lance Micklus, Inc., 217 South Union Street, Burlington, VT 05401; or Small Business Systems Group, 6 Carlisle Road, Westford, MA 01866 or any SBSG dealer.

Q: Is there, or will there be, an external monitor for the Epson HX-20? I'm interested in using such a product for word processing.

A: Epson has developed such a monitor controller, which is expected to accommodate 80 columns of text. At the time of writing however, neither the introduction date nor the price had been established.

Don't let price get in the way of owning a quality printer.

Adding a printer to your computer makes sense. But deciding which printer to add can be tricky. Do you settle for a printer with limited functions and an inexpensive price tag or buy a more versatile printer that costs more than your computer? Neither choice makes sense.

Here's a refreshing option — the new, compact STX-80 printer from Star Micronics. It's the under \$200 printer that's whisper-quiet, prints 60 cps and is ready to run with most popular personal computers.

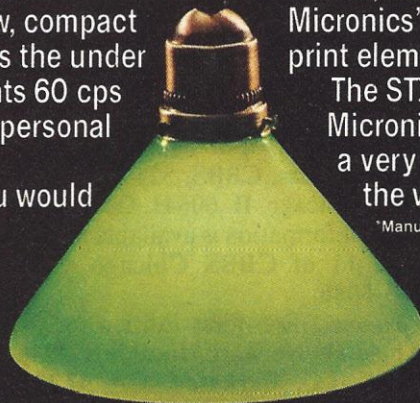
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expect in higher priced models. It prints a full 80 columns of crisp, attractive characters with true descenders, foreign language characters and special symbols. It offers both finely detailed dot-addressable graphics and block graphics.

And, of course, the STX-80 comes with Star Micronics' 180 day warranty (90 days on the print element).

The STX-80 thermal printer from Star Micronics. It combines high performance with a very low price. So now, there is nothing in the way of owning a quality printer.

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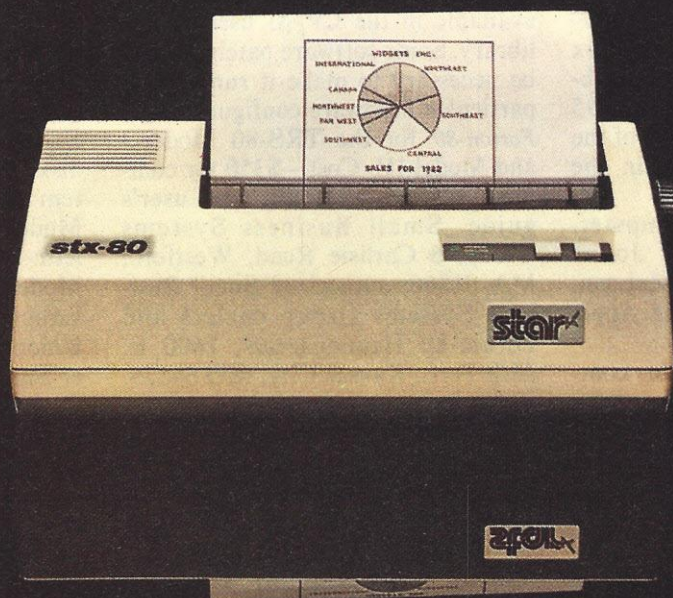


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CIRCLE 72



The new STX-80 printer for only \$199.*

Q: I am 16 years old and very "into" electronics. I am interested in building a personal computer, either from scratch or from a kit. My first choice would be to build an Apple II Plus, but I am also interested in other makes. Where can I get information on this subject? Also, would it be possible for me to build an Apple IIe?

A: We know of two places to get information. The first is NRI Schools, 3939 Wisconsin Ave., Washington, DC 20016. This company offers home-study courses in electronics and computer technology. They may offer a computer kit as part of one of their courses. The company offers a new course which includes a Radio Shack Color Computer in the tuition price.

Next, you can get a Heathkit catalog by writing to Heath Company, Dept. 342-014, Benton Harbor, MI 49022. Heath sells computer kits of many descriptions. One of these might be just the one you want.

We recommend going with a kit, rather than trying to build a computer from scratch. Computers involve fairly tricky timing and bus considerations, and they run at high speed. You could build a computer from scratch, have everything hooked up correctly, and the machine could refuse to run because there were too many spikes on a data bus from switching transients, for example. Problems like noise spikes, switching transients, insufficient gate fan-out and clock phasing have all been worked out by the engineers who designed the kits. So assuming you get the components in the right place, and everything hooked up to the right places, the computer kit should not only survive its "smoke test" (whether there is a loud pop and a wisp of smoke when you turn it on for the first time) but should work properly, too.

We've had personal experience with Heathkit products, having built a capacitive-discharge ignition sys-

tem and a 21-inch color TV set from this firm's kits. They're easy to build; the directions are straightforward and organized in a step-by-step fashion. Heath says it won't let you fail.

If you can't get the assembled computer to work, though, there's another plus: You can take it into a Heath Electronics Center and the technicians there will fix it, for a fee, of course.

We aren't aware of any kits for the Apple II or Apple IIe. You could build these from scratch, because the circuit diagrams are printed in the reference manuals. We wouldn't recommend it for the reasons we listed, but the information's there if you want to try it. Good luck.

Q: I have a TI 99/4A computer. Recently I saw a notice in another magazine that said Texas Instruments was encoding the ROM so that software not registered with them would not work on the computer. Is this possible, and how? How will this affect home programmers, and should I consider trashing my TI 99/4A and purchasing some other system?

A: You have several questions. Let's take them one at a time.

It's certainly possible for TI to do such encoding. The ROM can be programmed to look for some character string, for example, and to cease program load or execution if it doesn't find that particular string. Then the company would merely put that character string into the programs it distributes. This is only one of a number of possible schemes. Technically, it can be done.

Is TI doing it? In the early days of the TI 99/4, the computer's ROM was programmed to look for a feature called auto-incrementing memory in any program that resided on the plug-in cartridges the company sells. Auto-incrementing memory, according to a TI spokesman, automatically loaded program instructions from the

cartridge into a scratch pad area of RAM inside the computer. The processor then knew where to look for its next program instruction, and didn't have to decode an address for the next instruction fetch. This speeds up execution, and that's why the feature was incorporated.

At about the time when the 99/4 was replaced by the 99/4A, this auto-incrementing feature was dropped. TI executives have stated that they plan to implement the feature again, but have not decided when to do it.

When they do, any cartridge-based program that doesn't use auto-incrementing memory will be rejected by the processor. But any other program—any stored on disk or tape—will run just fine.

Thus there is no effect for home programmers because, in all probability, a home programmer will be saving his programs on disks or tapes, not cartridges. Cartridges require "burning" a PROM (Programmable Read-Only Memory), building a circuit board, and enclosing the whole in plastic. Most home programmers would have no need to resort to the expense, when disks and tapes work just fine for storing programs.

Furthermore, TI will make a list of programs for the 99/4A available from other vendors, if you write to the company in Lubbock, Texas. The spokesman says these programs are tested to ensure that they are real, and that they will load into the computer and execute before they are placed on the list. Third-party authors can also get their programs on the cartridges, through a program TI has for working with outside authors. Some two-thirds of the programs TI sells are from outside authors.

In view of all of the above, we see no need for concern. Hold on to your 99/4A: First of all, it's likely that your computer doesn't use auto-incrementing memory, and if that's the case, then this is a moot point.

(continued on page 19)

GUESS W MICRO

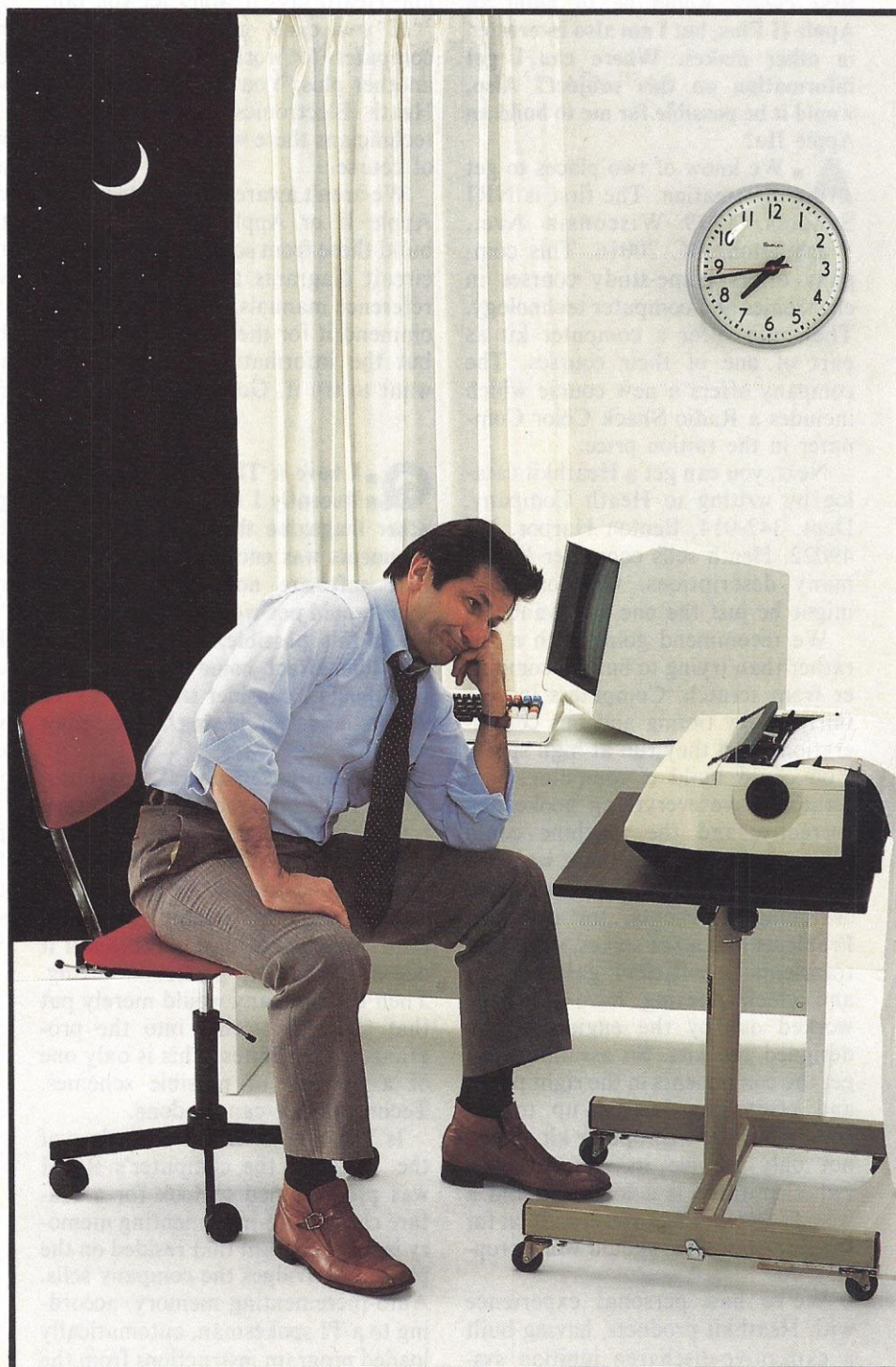
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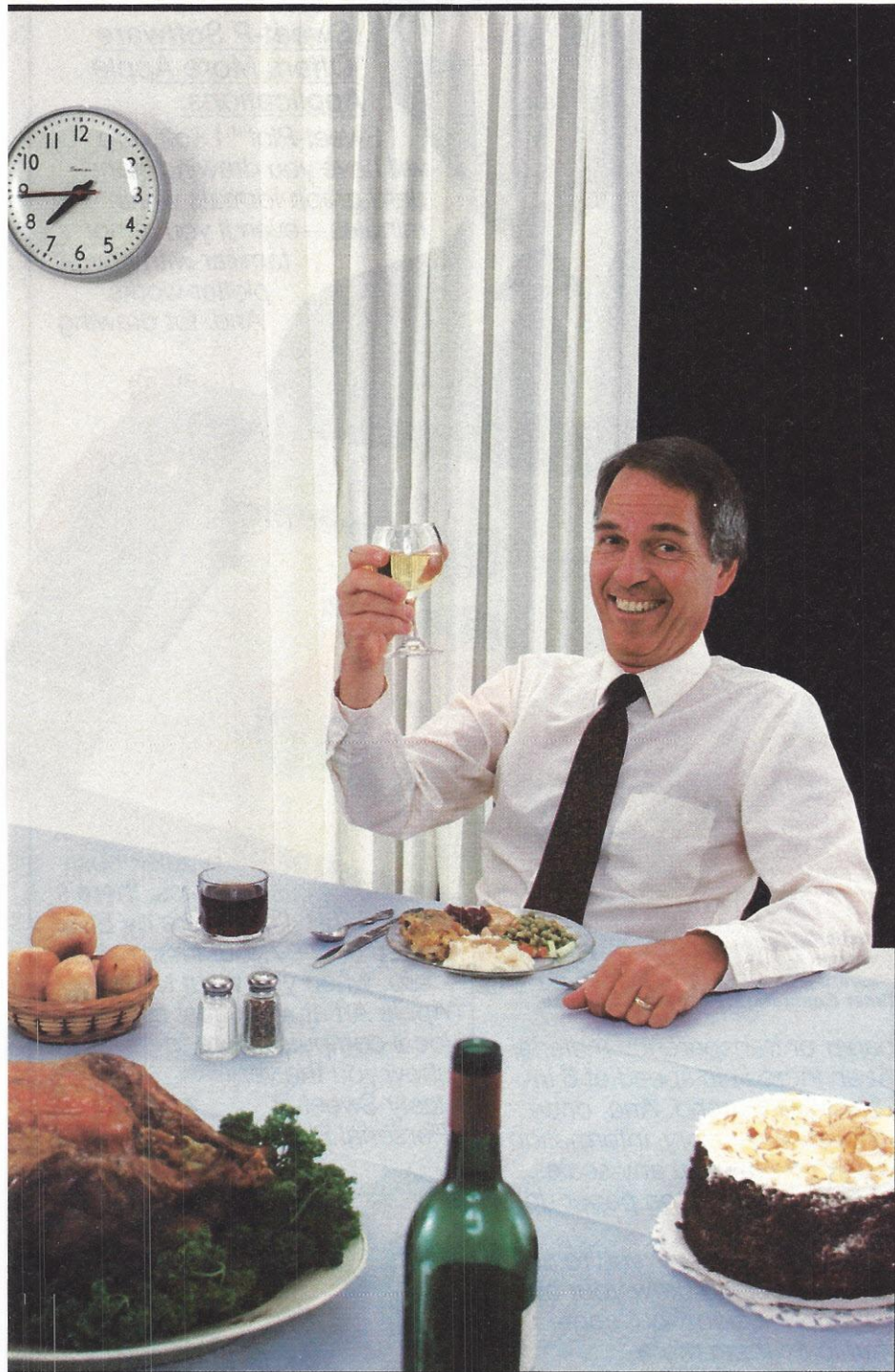
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If you're still guessing whether you can afford to have one, talk with any computer dealer. That's the best way to find out how practical a Practical Peripherals Microbuffer is.

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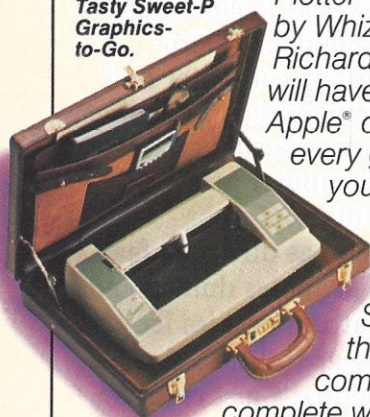
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CIRCLE 81

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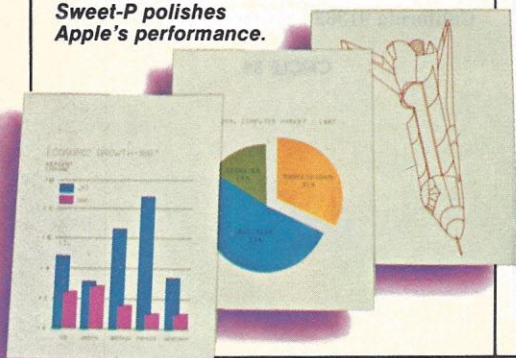
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CIRCLE 11

(continued from page 15)

Second, it's a 16-bit machine with powerful graphics, and it's getting more software capability all the time. Finally, any software on disk or tape will run just fine, so you can program your computer to your heart's content.

Q: I own a travel business and although I think that owning a computer may be of great advantage to us, I would like to be able to try it out first. Is there a computer company or person who will lease us a computer, perhaps with an option to buy? Is leasing our only way out?

A: Yes, you can lease a computing system; no, it is not your only way out. You can also obtain financing—either through a dealer or lending institution; or buy a relatively low-cost system and upgrade as you see fit.

To lease a computer, you can either go through a dealer or directly through a leasing institution. Not all dealers offer this service, but most do offer both leasing and financing programs. You can start your research in the Yellow Pages, looking under both "Computers-Dealers" and "Leasing Services" to see which firms mention computer leases in their ads. According to Kit Menkin, senior partner at American Leasing of San Jose, Calif., most terms of lease are three to five years with no down payment. If you want an option to buy the equipment, it must be specified in a separate letter, detailing whether the purchase option is to be in dollars, for a percentage of the new price, or for "fair market value."

Menkin says that to obtain financing from a bank, you usually have to be leasing \$100,000 worth of equipment, while national leasing companies don't like to lease under \$10,000. You have to be an existing company with quite a bit of money in the bank to lease. Menkin feels that a small business is best off going

through a local leasing firm which deals with smaller amounts. He estimates that small-business leasing arrangements tend to run in the \$3000 to \$8000 range for the computer, software and a high quality printer. One last point Menkin adds: Customers should ask for an investment tax credit from the leasing company. Most leasing companies won't tell you about it unless you ask, he says—they'll just take the tax credit for themselves.

The reasons to lease—or not to lease—a computer are similar to those for buying other pieces of capital equipment. However, you must consider all the software and peripherals you will probably buy outright over that period of time. These will tend to commit you to staying with the brand you leased in the first place, as will your desire to amortize the time it took you to learn the idiosyncrasies of your system. So you may not be as protected from obsolescence—real or imagined—as you might hope.

If you want to buy, but don't have a lot to spend, you can choose from a wide range of inexpensive office-oriented systems. These systems include the computer, disk drive(s), monitor and software. The software package usually includes an operating system, word processing, spreadsheet modeling, and a version of BASIC (for programming). Some also have file management, spell checking and/or money-management programs. Such systems can now be had for \$2000 to \$3000, complete with letter-quality printer. Some examples include the Cromemco C-10, Eagle II, Kaypro, Morrow Micro Decision 1, Osborne 1, and STM Pied Piper. Some more expensive computers may initially appear to be in this price range, by the way, but cost far more when you add up the cost of the software and other items. Such systems are for people who are willing to invest in greater expandability and versatility (like the

ability to run color displays, and to access large bases of educational and recreational software).

If you choose to buy instead of lease, financing can be handled through dealers, leasing institutions, and banks. Some dealers carry their own paper if the terms are for a year or less; and the down payment could be as little as \$100. Banks typically finance 80 percent of the system cost at 13 to 16 percent interest rates, though with good credit you could pay much less. Terms range from one to four years. Whether the dealer or a lending institution carries the note, you may find it possible to finance a system for about the same costs—immediate and monthly—as leasing.

Q: What are the risks or problems involved in purchasing software programs from mail-order discount vendors who advertise their products in *Personal Computing*?

A: Well, you could order a product and have the company go bankrupt before delivery, but that could happen with a local dealer just as easily. We remember one dealer in Palo Alto, Calif. who was open for business on a Friday. That same day, he closed shop, pulled up a truck, and gutted the store—and everyone who showed up Saturday thought they had the wrong address. Who knows what happened to orders pending or equipment in the shop for repair?

Next, you could order a product from an outfit that doesn't deliver the goods, substitutes cheaper merchandise for what you ordered (and paid for), or strips the packages—takes out things like batteries, discount Source subscription offers, or software that's supposed to come with the product.

No magazine has the staff or resources required to "absolutely guarantee" the performance of its advertisers. But here's something you can use to help you decide: Successful

(continued on page 22)

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CIRCLE 12

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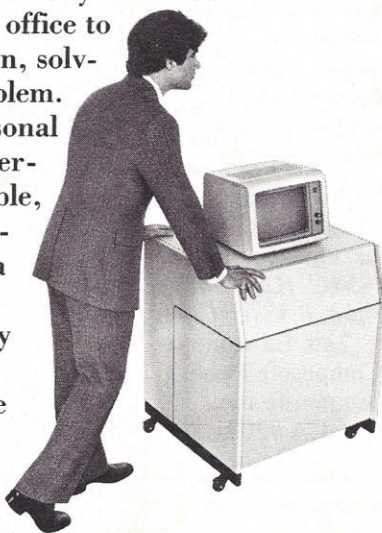
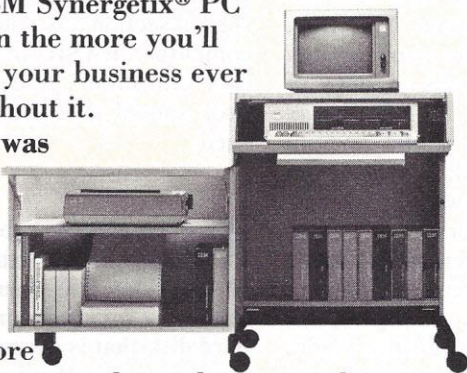
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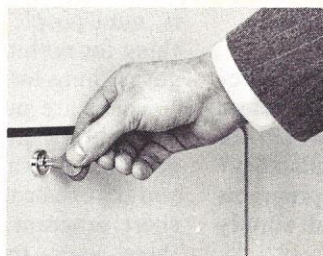


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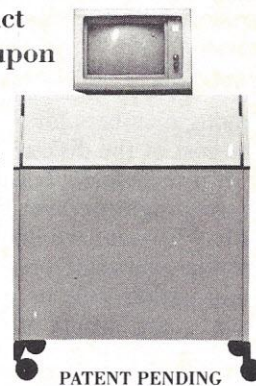
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(continued from page 19)

magazines like *Personal Computing* drop advertisers who don't honor their commitments (i.e., pay their bills); shoddy businesses tend to treat creditors and customers the same way (badly). So if you see that a mail-order house is advertising with us for a long time, the odds are that you'll get decent treatment. We have received very few serious complaints about mail-order firms who have advertised with us steadily, and who are with us now—and we believe our readers are the sort who'd let us know in no uncertain terms if they were having a problem with one.

Q: I hear a lot about public-domain software in magazines and books. How do I access it? Are there different forms of availability? I've heard about picking up programs over radio, networks, and simply mailing away for them.

A: You can access public-domain software in several ways. First, you can join one or more users groups which focus on the computer and/or operating system you use. Many of these groups disseminate programs among members for little more than the cost of the disk and handling.

It is technically feasible to disseminate programs over radio—especially FM—but we know of no commercial operation presently doing it. Information utilities often maintain user “areas” where programs may be placed in public domain. One is The Source, which also makes it possible to publish programs for profit through its services.

The simplest way to get public domain software—at least conceptually—is to copy program listings from computer hobbyist magazine articles and books. Unfortunately, our experience has been that many of these won't work—or don't work on your particular machine (BASIC, the most common language, comes in numerous dialects)—or you make a

simple error in your transcription... just enough to keep the program from functioning. You then have to track down the error through what may be hundreds of lines of code.

The trouble with public domain software, in general, is that even when it does work, what it accomplishes is often not worth the effort of acquisition or transcription. When someone creates a really good program he usually gets the urge to sell it, not give it away. And when you're used to quality commercial programs, it can be pretty taxing to put up with amateur software. The fact is, most people who try to get something for nothing end up feeling they got nothing for something.

There are publications that claim to publish high-quality public-domain software. We suggest that you try one or two of these, copying a short program from their pages. If these work, and you're happy with the results, you can keep going. If not, you're only out the cost of the magazine, and some time.

Q: Is there a reference book that would help me change a program written for one computer so that it can be used on another computer? For example, how would I put a program written for the Apple II onto an IBM Personal Computer. I'm mainly concerned with the different command words and instructions.

A: Yes, there is. One we know of is *The BASIC Handbook/Encyclopedia of the BASIC Computer Language*, 2nd Edition, by David A. Lien, Compusoft Publishing, division of Compusoft Inc., 535 Broadway, El Cajon, CA 92021. Not only does this book contain over 400 pages of BASIC commands found on some 250 different computers, it gives you a way of finding out just how your own computer—no matter how exotic—relates to other BASICs, and it gives you ways to emu-

late BASIC commands in dialects of BASIC that lack those commands. A special section lets you evaluate your computer's BASIC to construct your own “translator” guide. All in all, this book should give you just what you need.

Q: I'm confused about the idea of hard disk backup. On page 99 of your May issue you say backup is especially important in the case of a hard disk that is permanently located in the machine. If it is permanently in the machine, how can additional material be filed on the disk, once the disk is filled?

A: Backup is important with any kind of mass storage device, for the same reason that it's wise to keep copies of valuable papers in a safe—and separate—place. Loss or damage of the millions of characters of data contained on a hard disk could be disastrous for a business. Most hard disks are permanent units, with the disk itself sealed into the drive. Because of this, you can't take disks out to make copies. And when the permanent disk is filled with information, you can only add more by erasing something. The trick, therefore, is to have a workable system for protecting the data you're storing on hard disk, and for moving data from the active location on the hard disk to an archival location in some other form.

Hard-disk-based systems almost always have one or more floppy drives as well, for both input of programs and data from other machines, and for creating backups. Hard-disk operating-system software usually has provisions for backing up the data on a sequence of floppies and/or onto some form of tape medium—cassette, cartridge, or videotape. These can be used for both backup and archival data storage. Another way of providing backup is to have a second permanent hard disk drive

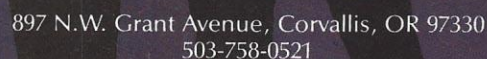
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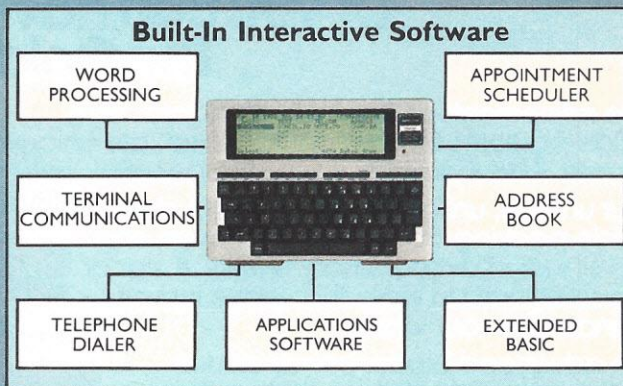
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(continued from page 22)

whose contents always mirror those of the primary drive, by virtue of frequent backup operations.

All these forms of backup can be time-consuming without sophisticated operating software that lets you back up data by some systematized means—by date, for instance, so that the system automatically backs up only the data that has not been backed up previously. Backing up large files onto floppies may also demand software that can automatically record the file onto a sequence of floppies. This process requires only that you insert another floppy in the drive when the computer requests it.

Q. On page 169 of your May issue you refer to “bank-switched RAM.” Does that mean the computer uses up so much memory and then has to be manually switched to continue work? If not, what is the difference, compared with any other computer which has about 128k of memory?

A. Bank switching lets your computer’s processor address more RAM than it can address directly. Circuitry in a bank-switching setup automatically directs your microprocessor’s “attention” to alternate banks of RAM in your computer’s memory, circumventing the processor’s natural limits. It has some limitations compared with being able to address the same amount of RAM directly, but with the right software you’d never know the difference in many applications. It gives smaller 8-bit computers a way of equalizing the odds against their more powerful (and expensive) 16-bit cousins.

Fundamentally, computers are run by their microprocessors. Each microprocessor has a maximum amount of RAM it can address. Two of the most common processors—the Z80 and the 6502—cannot, by themselves, directly address more than 64k of RAM (although particular

machines, most notably the Apple III, surround their main processor with associated processors and circuitry to circumvent this limit). When you want to address more than, say, 64k, you have two hardware choices: another processor, or bank switching. You can use software to implement a virtual-memory scheme, where memory overlays are stored on disk and loaded upon command. But such schemes are expensive, and haven’t yet been implemented commercially on personal computers, to our knowledge.

The two best-known bank switching setups today are the 128k version of the 6502-powered Apple IIe; and Z80-based computers capable of running CP/M Plus, such as the 128k version of the Radio Shack Model 4. These machines are capable of performance rivaling that of many 16-bit computers; upcoming software will be the proof of the pudding. As a preview, bank-switched accessory cards and software providing hundreds of kilobytes of RAM are already in use in machines like the Apple II Plus for specific applications, like VisiCalc files (up to 176k user space) and disk-drive emulation (up to the limits imposed by Apple DOS). The greatest limitation of bank switching is the extra programming needed to use it.

Q. There does not seem to be much information on the Lanier word processor. How does it compare to other word processors? Is sufficient software available? Is the hardware reliable? Does the company provide an acceptable degree of support?

A. We really can’t say from our experience, and since the Lanier word processor, and all dedicated word processors for that matter, is out of our field of expertise, we have to defer to the experts.

Two books which might give you the answers you need are *The Word-*

processor Book, by Peter A. McWilliams, Prelude Press, Los Angeles, Calif., and *The Word Processing Buyer’s Guide*, by Arthur Naiman, McGraw-Hill Book Company, New York, N.Y. Both these volumes discuss word processing in great detail.

Q. What is handshaking, especially in the context of word processing, using a computer, printer, and a word-processing program?

A. In a general sense, handshaking refers to matching a computer with its peripherals so that you command the whole system, and it responds as a single device. When you tell the system to print something you’ve written, it does so without you having to specify communication parameters each time you print.

Hardware handshaking is accomplished with “intelligent” peripherals that tell the computer about their state of operation. For instance, if you run out of paper, the printer will signal the computer to stop sending data until you load paper. Without handshaking, the computer would continue to spew out data.

Software handshaking supplements the hardware handshaking with other features. For example, if you have an NEC PC-8023A-C printer, and your word-processing program has an automatic printer configuration provision that lists this particular printer, the program implements a printer “driver” that knows how to run the NEC. If you get another printer, you rerun the configuration program and select your new printer from the list provided.

If your printer isn’t listed, it’s often possible to select a printer with a similar configuration and fine-tune the match. At this point it would be nice if the dealer who sold you the new printer could help. And you could also appeal to the software manu-

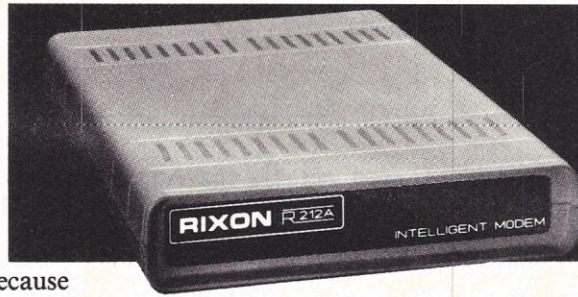
(continued on page 30)

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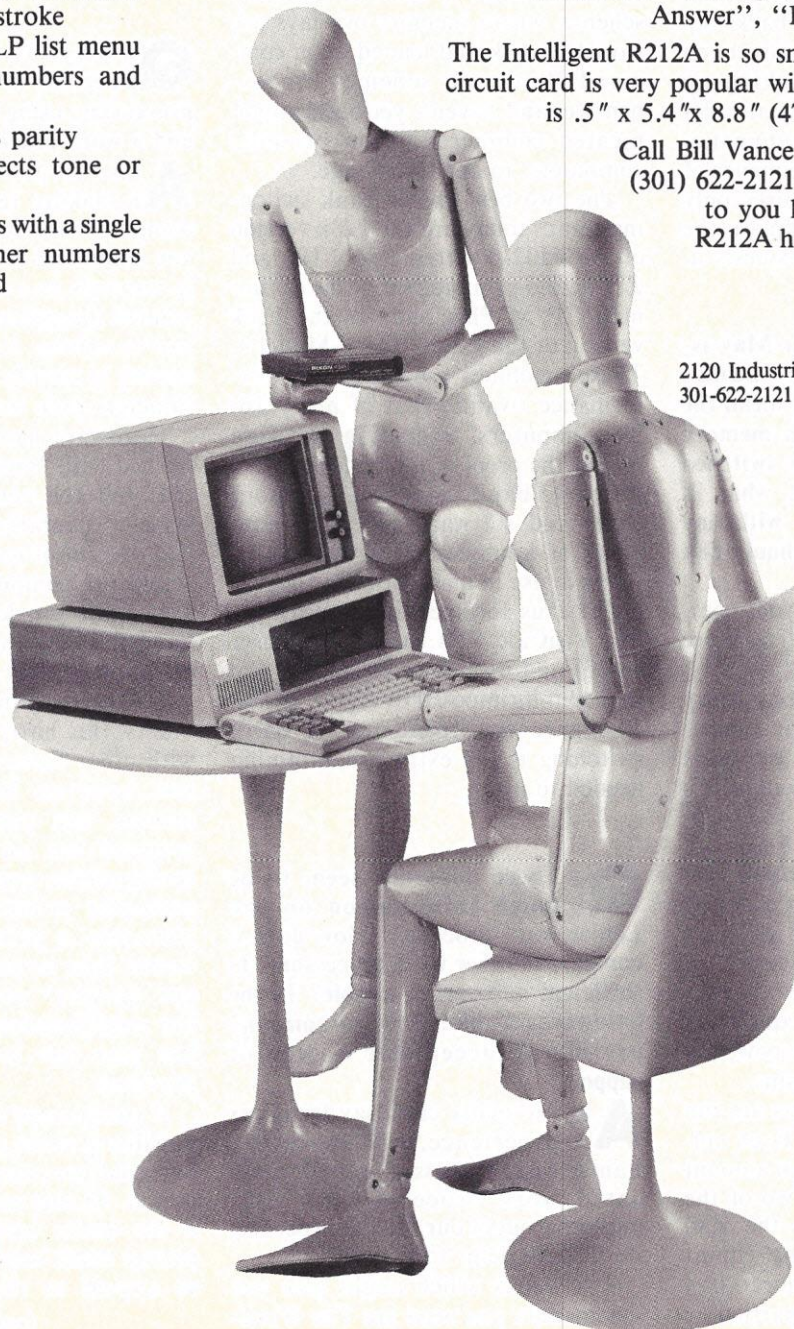
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(continued from page 27)

facturer to write a printer driver for your model. Sometimes you'll find they've already done that, and all you have to do is get your program updated. Software makers tend to update programs frequently to keep them competitive.

Q. I'm a large-system programmer, and I also teach BASIC programming in a continuing-education course. Recently I showed my students how to round off to dollars and cents by using the following statement:

```
10 PRINT INT
  ((1.655+.005)*100)/100
```

This statement executed properly on the TRS-80 computer, giving the answer 1.66. But when some of my students tried it on the Apple II, they got 1.65. What rule have I broken to get the wrong answer?

A. None. The people at Apple Computer were as mystified as you were, until they thought about it for a while. Since you program large systems, you surely know that computer number representation is subject to round-off error. That's apparently what's happening here, the experts think. For some reason, the number $1.655 + .005$ is just sufficiently borderline to confuse the computer when it truncates the result to get an integer. It's probably internally represented as $1.659999999...$, which the screen-display hardware will truncate to a 1.66 when it's displayed as a real number. But then multiply this number by 100 and you will get $165.999999...$, which becomes 165 when it's truncated to an integer. Dividing by 100 completes the error.

Apple says this is a result of the way its BASIC Applesoft represents this particular number. Your algorithm works on other numbers, just not this one. Apple points out that the TRS-80, or any 8-bit computer for that matter, will run into the same

problem with any number that's sufficiently borderline to confuse the computer during number representation and integer truncation.

The differences arise because of non-standard number representation and handling. The Institute of Electrical and Electronics Engineers has adopted standards for these activities, but they weren't incorporated into the Apple II, nor into other 8-bit computers, because of the limited precision of these machines. Apple's Gary Baum says the Apple III follows the standard, and it's the only 8-bit machine he knows of that does. As long as non-standard representations are used, different computers will represent some numbers differently.

CP/M has long been criticized by industry experts for its limitations as an operating system. But it works on more types of computers than any other operating system, and hence has made it possible to use a given program on a wide variety of machines, with minimal changes for each machine. Digital Research has labored to create a whole family of CP/M operating systems for 8- and 16-bit single-user and multiuser computers. One of the latest, CP/M Plus, allows you to utilize 128k RAM memories effectively—a real boon to small computers, since it allows user files in RAM of up to 64k, and large, powerful, and/or user-friendly programs in the other 64k.

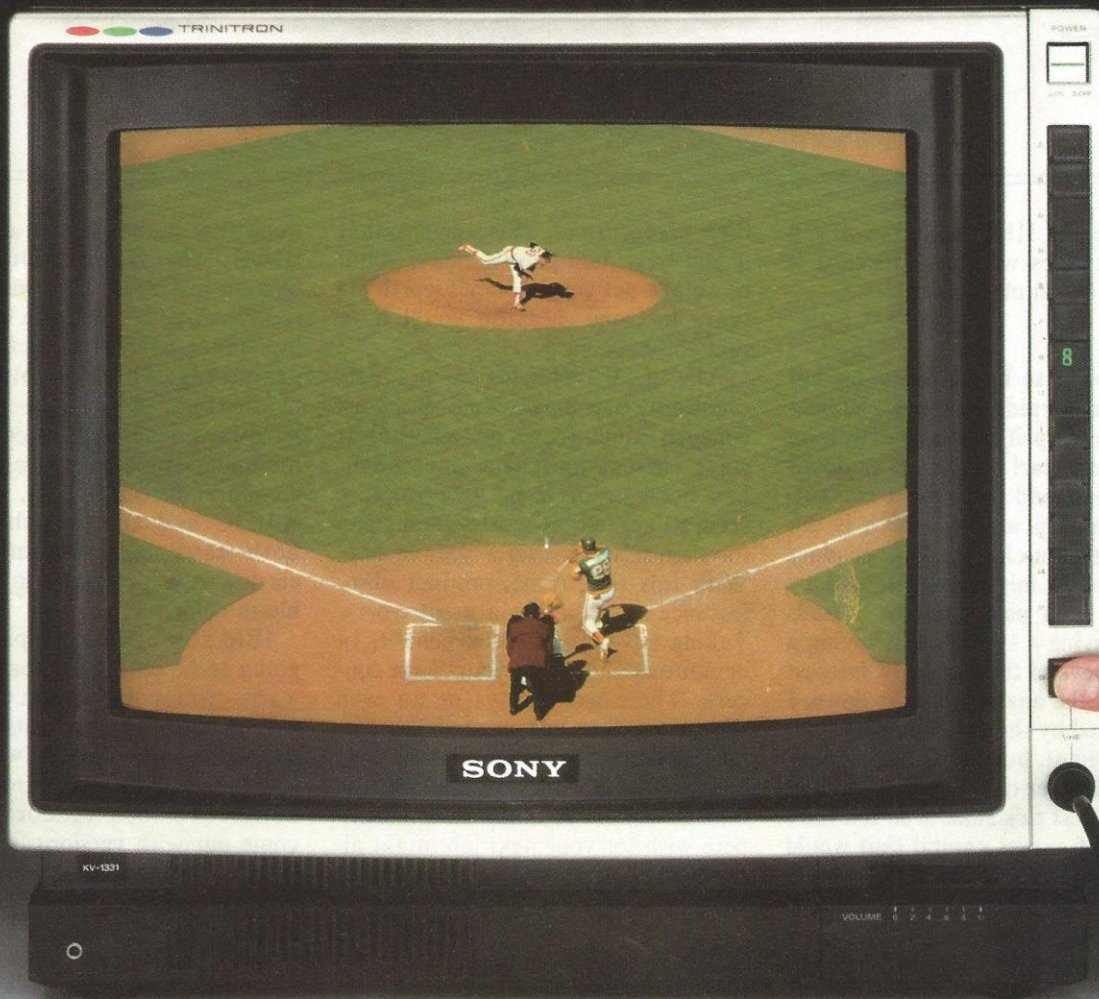
Q. There are two terms I don't understand: "CBASIC" and "CP/M." What do they mean and what computers use them?

A. According to Tom Byers, product marketing manager of BASIC products at Digital Research in Pacific Grove, Calif., "CBASIC is actually two separate product lines: One is a pseudo-code interpreter (CBASIC) and the other is a true machine-code compiler (CBASIC Compiler). CBASIC compiles source

code into pseudo code, which is interpreted at run time. CBASIC Compiler is different from most versions of BASIC because it is compiled rather than interpreted. This means that once you've written a program in CBASIC Compiler the computer can translate it into the machine language needed to run the program. Most other BASICs are interpreted—the language must retranslate your program into machine language each time you run the program. Obviously, compiled programs run much faster, other things being equal. Less obviously, interpreted programs are easier to change, since each change you make in a compiled program—no matter how small—requires recompiling the whole thing. In a big program, that can be time-consuming. So while CBASIC is an excellent BASIC, it's not universally superior.

Byers adds that the "C" in CBASIC and CBASIC Compiler stands for "commercial," meaning the product is specially designed for business programmers. Digital Research recently announced an interpreter designed especially for the first-time programmer, called Personal BASIC.

CBASIC runs on most computers with the Z80, 8080, or 8085 microprocessor. A 16-bit version, called CBASIC-86, runs on 8086 and 8088 microprocessors. The easiest way to tell whether a computer could run CBASIC is to determine whether it uses the CP/M operating system, which also comes in 8- and 16-bit versions and runs on the same computers as CBASIC. CP/M stands for Control Program for Microcomputers, and "fits" between an applications program and the computing hardware, helping each run with the other. CBASIC and CP/M are both produced by Digital Research. Some computers with different processors can still run these products if alternate processors like the ones listed above are installed. For instance, the



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Apple IIe and III computers will run these packages when a Z80 card is installed (a simple matter).

Q. I want to buy a computer but I'm afraid of rapid obsolescence. Your April interview with John Cavalier of Atari caused me to doubt whether I should purchase a computer system in a market which is advancing so quickly that a product bought today might be outdated by the time it is paid off. My friends equate buying a system with buying a car, but beyond the matter of interest payments the analogy breaks down. I was excited by the developments Cavalier hinted at, but at the same time I wondered about the wisdom of a large investment at this time. I do not have the kind of excess capital that would allow me to simply discard one system for another. Am I overstating the progress of the industry? Are my fears unfounded?

A. The first personal computers—dating from the mid-70s—are totally obsolete. They weren't reliable, they had no off-the-shelf software, and input could be made only via panel switches. In short, only a computer specialist or hobbyist could run one. Today, mainstream computing systems run reliably, have plenty of applications programs, and accept input which is easily understood. In short, any intelligent person can use one without having to become a computer specialist or hobbyist. And that's been true for about two years. The bottom line is that as long as a computer is electromechanically reliable, the primary gauge of its continuing value is not speed or even price—it's the software it can use. And the popular personal computers of today all enjoy wide, steadily evolving software bases.

Future computers will get faster, cheaper, and more versatile. But the new computers introduced by Apple, Atari, and Radio Shack this year are all largely software-compatible with

their predecessors. This suggests that if you buy intelligently today, you'll be able to get your money's worth for years to come, because you'll have that software base.

Almost all technological products eventually become obsolete. But your concern must focus on whether it stays current until your investment has been amortized. Our readers seem to agree that most systems pay for themselves within a year or two. With this timeframe, product obsolescence shouldn't be a great worry. Taking advantage of the benefits of computing should be your main concern. There will always be an even slicker product just around the corner, and you can spend all your time waiting for it. But, meanwhile, the man or woman you may have to compete with for your next job might already have bought a computer and be using it to advantage.

Q. I would like to find out if I can run IBM software on my new computer, a Heathkit HSG-120-21 (the kit version of the Zenith-120). According to Heath, its Z-DOS is compatible with IBM PC-DOS and Microsoft MS-DOS. I am particularly interested in Continental Software's Home Accountant program, which runs on the IBM Personal Computer. Will it run properly on Heath's computer? If not, are they planning a version that will? Or should I go ahead and buy the Atari version for my Atari 800?

A. This is the kind of question owners of many work-alike computers ask and the answer is usually yes.

You can run a fair amount of IBM software on your Zenith. Both Z-DOS and IBM's PC-DOS are customized versions of MS-DOS, which was originally developed by Seattle Computer and marketed by Microsoft. All the versions overlap. The main problem areas appear to be fancy video display mapping, program-

ming that makes system calls to the BIOS—the Basic Input/Output System in CP/M—software that interacts directly with the computer's individual characteristics, and programming which involves heavy memory mapping—again, a hardware-dependent process which manipulates memory locations in the computer directly. Last, the IBM's BASIC and the Zenith's BASIC both have color commands that clash—so you're going to have trouble in color.

IBM's own software products are going to be optimized for that hardware—you should expect them not to run on your Zenith. Outside vendor software may run, however—the more basic the programming, the better. Various vendors will also come out with versions of their programs optimized for particular IBM Personal Computer work-alikes such as the Heath/Zenith computer. And with the Z-80 processor in your computer you can also run CP/M versions as well. According to Heath, programs like dBASE II and Condor data-base programs run without modification on the Heath. And Structured Systems Group in Oakland, Calif. is developing a CP/M version of its accounting package to run on your computer.

As for Home Accountant, you have two possibilities. The IBM version may run on the Heath/Zenith without problems, but Continental Software hadn't finished testing it at time of writing. They don't think there should be any problems, but they can't come right out and state that as yet. Also, the Osborne computer version in the CP/M operating system should be able to run on your machine if the IBM version doesn't—just have your dealer transfer the program from the Osborne disk format to the Zenith. That would run on your machine's second processor—the Z80. However, you should know that the Osborne version has fewer features and capabilities than the



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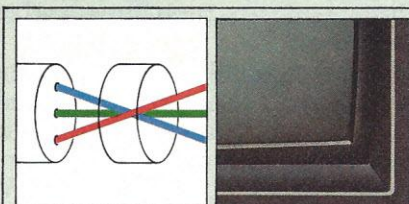
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CIRCLE 19



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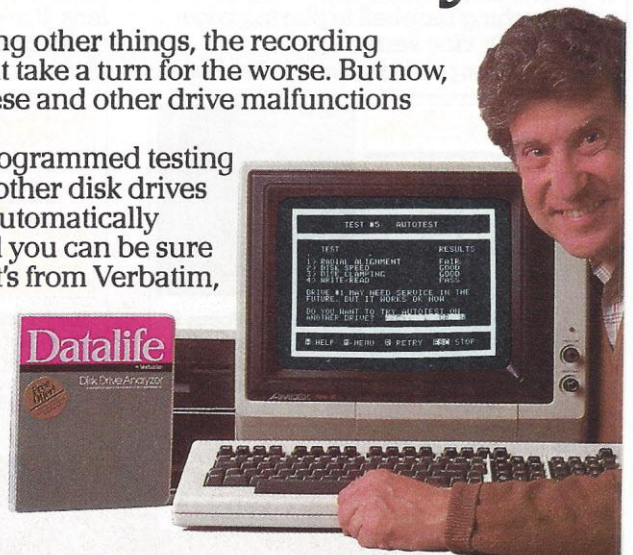
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IBM. At this time Continental Software is in the process of deciding whether to produce a version specifically for the Heath/Zenith—they're trying to assess demand. Check with your dealer for the final word.

Q. "A Fluid Well For Your Words," an article printed in your January 1983 issue, was of great interest to me, as I am a writer. I have a dedicated word processor—a Dictaphone Dual Display—but I have been searching for a portable processor which I might use when I travel and which could be equally adaptable to the large screen of my home processor and my Diablo printer. As the portable unit must be "asynchronous" (whatever that means), I have had difficulty in finding a suitable unit which would work together with my word processor. Can you help me?

A. Most portable computers are capable of asynchronous communication. That's the way personal computers generally exchange data. All it means, basically, is that the rate of data transfer is flexible instead of being synchronized, with information transmitted character by character, accompanied by "start bits" and "stop bits" to tell the computer when one character leaves off and another begins. The actual data are transmitted in ASCII code, a common convention whereby a given string of binary "bits" is taken to mean a particular letter, number, or symbol.

Thus, as long as your portable computer communicates in asynchronous ASCII code you should be OK—theoretically. You can hook up the portable with your Dictaphone through each computer's serial port—a kind of plug convention used for modems (telephone interfaces) and many printers. You might have to get a custom cable made up to connect your machines, but the dealer who sells you the portable should be able to do that as long as you can

provide him with the technical specifications of your Dictaphone.

As far as particular types of portables go, you'll probably want the kind you can do touch typing on if you're a writer; but you'll also probably want the smallest unit that can do the job. You'll also want one with editing software built in so you can do word processing without having to load in the program off a tape. That means you should look for a computer with the editor in ROM, and try it out to see if it feels as though you'll be able to focus on your writing instead of the instrument. You'll also probably want a machine that can run on batteries, for the greatest flexibility. There are several candidates that do (or soon will) fulfill these basic requirements.

The smallest touch-type computer is the Hewlett-Packard HP-75C, with a one-line LCD display. You can't type rapidly, but 30 to 35 wpm should be possible. If you want to save data you'll need to add a tape recorder; likewise, you'll need a printer for printouts. Both items are available from Hewlett-Packard. (Hewlett-Packard calls its tape recorder a digital cassette.) If the file is short enough, you can just leave it in memory—the HP-75C has continuous memory up to the limit of its RAM.

Two units with more full-size keyboards are the Epson HX-20 and the Radio Shack TRS-80 Model 100. The HX-20 has a built-in tape recorder and printer, along with a 20 by 4 display; while the TRS-80 Model 100 has a 40 by 8 display—but neither printer nor tape recorder is built in. All these machines sell for under \$1000 in their basic versions, and each offers a desirable approach to portability.

If you don't mind traveling a little heavier, you might also look at the STM Picd Piper, which has an 80 by 2 display (similar in word count to the Epson) and a single disk drive built into a very compact design.

With this configuration it will run close to \$2000, but has very large storage capacity—over 750,000 characters of information.

Depending on just which kind of compromise represents optimized portability to you, any one of these machines, with the appropriate interfacing, could satisfy your needs. They would all adapt to your large computer and printer the same way—by plugging a cable from the portable to the Dictaphone and loading your files into the Dictaphone's memory.

Q. Can the Okidata ML192 produce thesis-quality print?

A. We're inclined to think so. Most theses need to have better print quality than what you get with dot-matrix printers' "data processing" mode. On the other hand, you don't need the absolute clarity of a good daisywheel printer's output. A number of printers in the Okidata's price range (about \$700 list) use a combination of tricks to overcome the inherent weaknesses of the dot matrix print-by-the-dots format. One trick is to use the Emphasized printing mode. This prints more slowly than the data-processing mode, allowing the print wires to place more ink per strike on the page. This creates a darker image, though the fact that the letters are comprised of dots is still obvious. The Double-Strike mode, however, prints each letter twice, with the second impression offset slightly. This fills in the spaces between the dots. Emphasized and Double-Strike modes can be engaged simultaneously for near-letter quality. Finally, printers like the Okidata have enough print wires in the print head to form letters with more dots, including two-dot descenders to make letters like "y" and "q" look right.

The net effect of these enhancements is print quality to which only the most curmudgeonly of thesis committees would take exception. But if you have any doubts, go to your

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dealer and have him run off print samples of the printers you're considering. Most printers have the built-in capability to generate a sample of all the print modes the machine can generate—but make sure it includes the Emphasized-Double-Strike mode sample, or have the salesman create one for you. Then you can be sure before you buy.

Q: I want to lower the noise level of my hard disk drive and printer—and get a faster printer, too. I have a Digital Microsystems hard disk with an 8-inch floppy drive and 24 Mbytes of storage. I have had the system for one year and use it a full eight hours a day, with no mechanical problems. Do you know of any way I can quiet this drive? My printer is both noisy and slow—35 cps is not fast enough for my purposes. Would an inkjet or laser printer be faster and quieter? Do they really give letter-quality print? If so, who manufactures these types of printers?

A: As far as noise goes, you need to acoustically isolate the noisemaking devices or replace them with quieter ones. The new generation of 5¼-inch stack hard disk drives tends to be much quieter than the older 8-inch units. But it seems a shame to give up a system that's giving you good service otherwise. The hard disk can operate at some distance from the computer(s) it serves—why not put the unit in a separate room, and put the printer there too? That's what many businesses do. They either convert a small room for this purpose, or build an internally partitioned room with soundproof walls. Just make sure the room is air conditioned—you don't want either machine to overheat. If you want the printer closer to you, several firms make acoustic enclosures for letter-quality printers. You can inquire at a Radio Shack computer center (Radio Shack's TRS-80 acoustic cover reduces noise, but you can't use it with sheet feeders

or envelope feeders), or try one of the computer supply catalogs.

As far as speeding up your printing, laser and inkjet printers are still not cost-effective in the personal computing marketplace. However, you can investigate some of the new "almost letter-quality" dot-matrix printers. Some have letter quality so close to daisywheel output, that you'd need a magnifying glass to see any real difference—and they can print at over 200 cps. As a matter of fact, you could keep your present printer for when you need "real" daisywheel quality, and pick up one of these dot-matrix workhorses (in the vicinity of \$1800 to \$3000) for your high-speed needs. It could run off your parallel port, while the letter-quality machine runs off the serial port. Just make a second copy of your word-processing software and configure it to the parallel port, so you can use whichever printer is best suited to the task at hand. There are faster daisywheel printers than the one you have, but they're not much faster.

Q: I am interested in the Osborne Executive computer described in your May issue—not for its portability, but for price and other features. Is there any advantage to the "half-height" disk drives? For example, are they more susceptible to problems? Do they decrease the mean time between failures (MTBF)? Finally, is it still possible to use an external monitor with the new Osborne Executive computers?

A: Half-height drives appear in many computers, and we haven't heard of any significant differences in reliability between the older designs and these more compact models. Half-height drives represent the continuing trend toward miniaturization in the personal computing industry. Their main advantage in the Osborne is that they take up less space, thereby allowing the Osborne to use a larger monitor than

the preceding model—a 7-inch screen versus a 5-inch screen. But even though that's great for traveling, Osborne recognizes the need for large-screen provisions—and the Executive hooks up to external monitors, just as the Osborne 1 does.

Q: We have been using an Apple III with VisiCalc 1.1 for several years and have a significant investment in VisiCalc models. We plan to upgrade to an IBM Personal Computer for several reasons and wonder if there is a conversion program available to convert VisiCalc 1.1 models on an Apple III to the IBM VisiCalc format?

A: Yes, there is. A number of programs—including all versions of VisiCalc—can store files as DIF (Data Interchange Format) files, and can convert existing files to the DIF format. Once in this format, they can be sent from one computer to the other through the computers' RS-232-C serial ports. All you need is a cable to connect the computers—your dealer can help you if you don't have one. There are two types of serial ports, and if the Apple and IBM ports you're using are of the same type, you'll need either a custom cable or a Radio Shack "No Modem" plug, into which you plug standard serial cables from both computers. Alternately, you can send and receive DIF files via modem, as long as your modem software supports DIF file transmission. VisiCorp's VisiTerm is one such program.

As far as the DIF format is concerned, your VisiCalc manuals will tell you how to convert your files to DIF files. DIF was created by Software Arts, the originators of VisiCalc and TK! Solver. This company maintains a DIF clearinghouse and publishes a newsletter. For more information, contact DIF Clearinghouse, Software Arts Inc., 27 Mica Lane Rd., Wellesley, MA 02181, (617) 491-2100.

Q. How do I connect my Osborne 1 computer to an Epson MX-80 or FX-80 printer?

A. Some of the most commonly asked questions in personal computing pertain to connecting printers to a given system. The process is similar for most computer/printer combinations. You plug the devices together, configure the software, and configure the printer switches (if needed).

You have to get the right cable to make the physical connection and the pinouts have to correspond. "Pinouts" refers to which pins on the plugs correspond to which types of control signals. Usually you don't have to worry about pinouts, since a few conventions are widely popular—mainly the Centronics-style connection. After making your physical hookup you need to configure the software that uses a printer—mainly your word processor—to use the control codes your printer recognizes for various print functions. Most programs now have menu-driven configuration routines that make this no more than a fill-in-the-spaces exercise. Lastly, you'll need to check the printer's DIP switches to make sure they're aligned right. DIP switches are found in a small integrated circuit package; each separate switch can be set to ON or OFF, and is often so small you can move it with a ball-point pen point.

Osborne technical support claims it's fairly simple to connect the Epson MX-80 or FX-80 to the Osborne 1. A standard Centronics cable and plug will physically connect the printer to the Osborne's IEEE-488 parallel port. Then you need to open up the Epson's manual and look up the codes recognized by the Epson for things like underlining, boldface, and so forth. Going into your WordStar Install program, you then insert the appropriate commands into the menu-driven configuration routine. You'll need to know them in both ASCII and hexadecimal. This sounds more

imposing than it is—each command will be listed both ways. Just jot them down and enter the same characters when asked to by WordStar.

The Osborne's word processor comes already configured for a "teletype-like printer with backspace capabilities," so you don't need to do anything beyond entering control codes. You'll also want to configure your CP/M operating system to recognize your Epson. For this, just boot the setup program from your DIRECTORY (you get the directory by typing DIR), and tell the program your printer runs at 1200 baud.

Finally, you need to be sure the DIP switches on the Epson are set right. The manual will tell you how to open up the Epson to get at them. There are two rows. Row SW-1 is set with everything ON except 1-4 and 1-7, which are OFF, Row SW-2 is set with everything on except 2-3 and 2-4, which are OFF. Then it should all work. But if it doesn't, Osborne's tech support people are quite familiar with this installation and can help you if the dealer can't.

Q. What line printers with a speed of at least 200 lines per minute are available for the IBM Personal Computer and/or IBM XT? Are spoolers and/or buffers also available? And finally, who services the printers?

A. Several dot-matrix printer manufacturers have high-end models at the speed you're looking for. Just to give an example, Okidata makes two Pacemark Family machines, the 2350 and the 2410, which run considerably faster than you require and connect to the IBM computers without difficulty. Your desired speed of 200 lines per minute corresponds to about 260 cps, and the Pacemark machines can run at 350 cps. They list for \$2695 and \$2995 respectively. Service is provided by Xerox's nationwide service organization. Spoolers and buffers are

available independently of the printers, though most new printers come with some buffer—the Pacemarks have 2k buffers, for instance. You might check out firms like Quadram and Practical Peripherals for printer controller/buffer boards which either fit into the IBM, or can be mounted externally.

Q. What is an operating system? Is it a piece of hardware, software, or both?

A. An operating system is a piece of software, though you might have to add some hardware to your computer to run some operating systems that were not originally designed for your computer. The Sybex *International Microcomputer Dictionary* defines an operating system as "the software required to manage the hardware and logical resources of a system, including device handling, process scheduling and file management." One of the most important functions of your operating system is to coordinate the interaction of your computer and its disk drive(s).

Sometimes operating systems are incorporated into applications software; other times they exist as stand-alone programs. The best-known stand-alone operating systems include the DOS (Disk Operating System) supplied by the manufacturer of your computer (Apple DOS, Radio Shack TRS-DOS, IBM Personal Computer DOS, etc.); and major independent programs like CP/M and the Pascal P-System, which run on many computers. You usually get one operating system with your computer, and you can buy others as needed. People in the industry hoped for a long time that we would wind up with one operating system per computer. Now it looks as though each computer will, as a matter of course, be equipped with several operating systems in order to make the fullest use of the applications software that runs

(continued on page 43)

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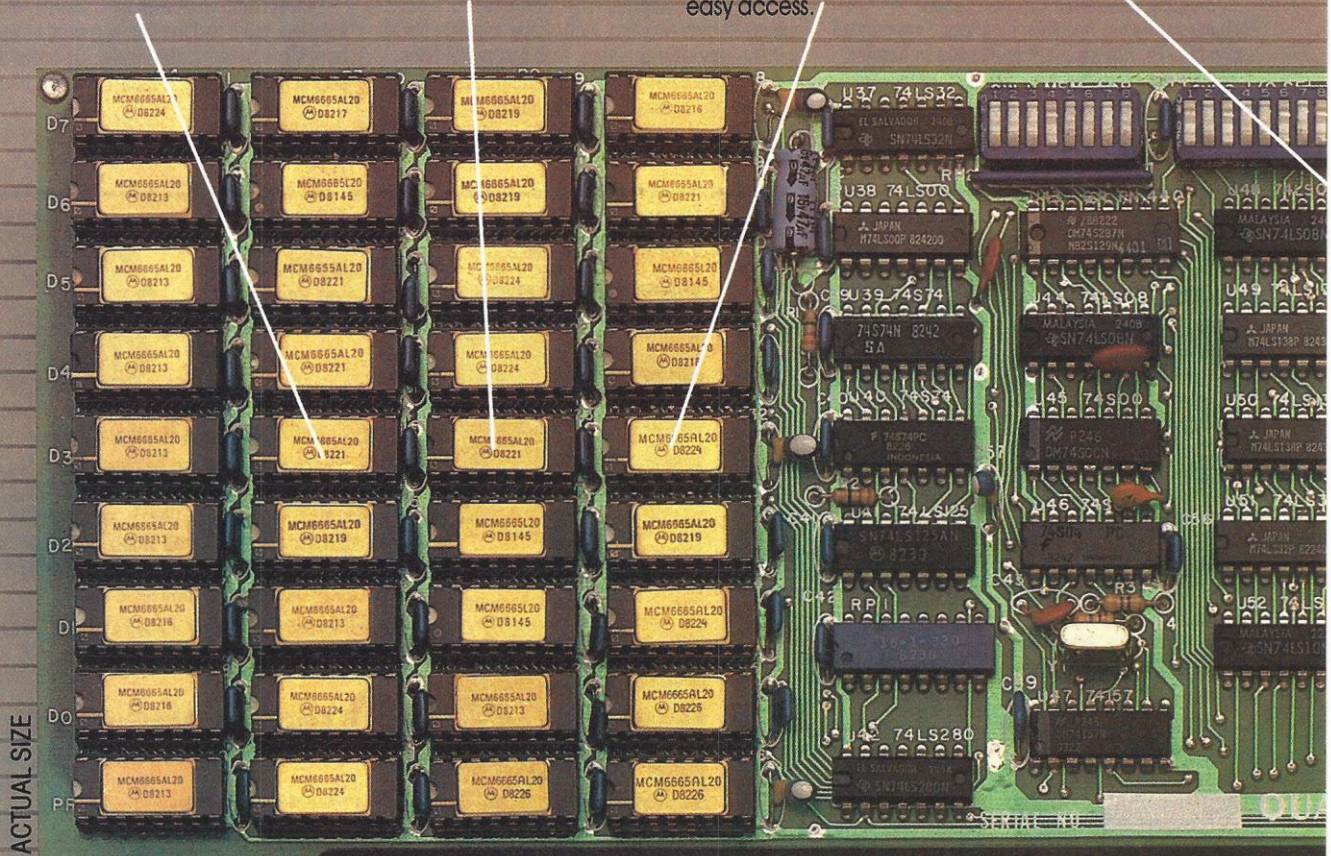
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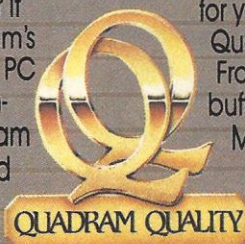
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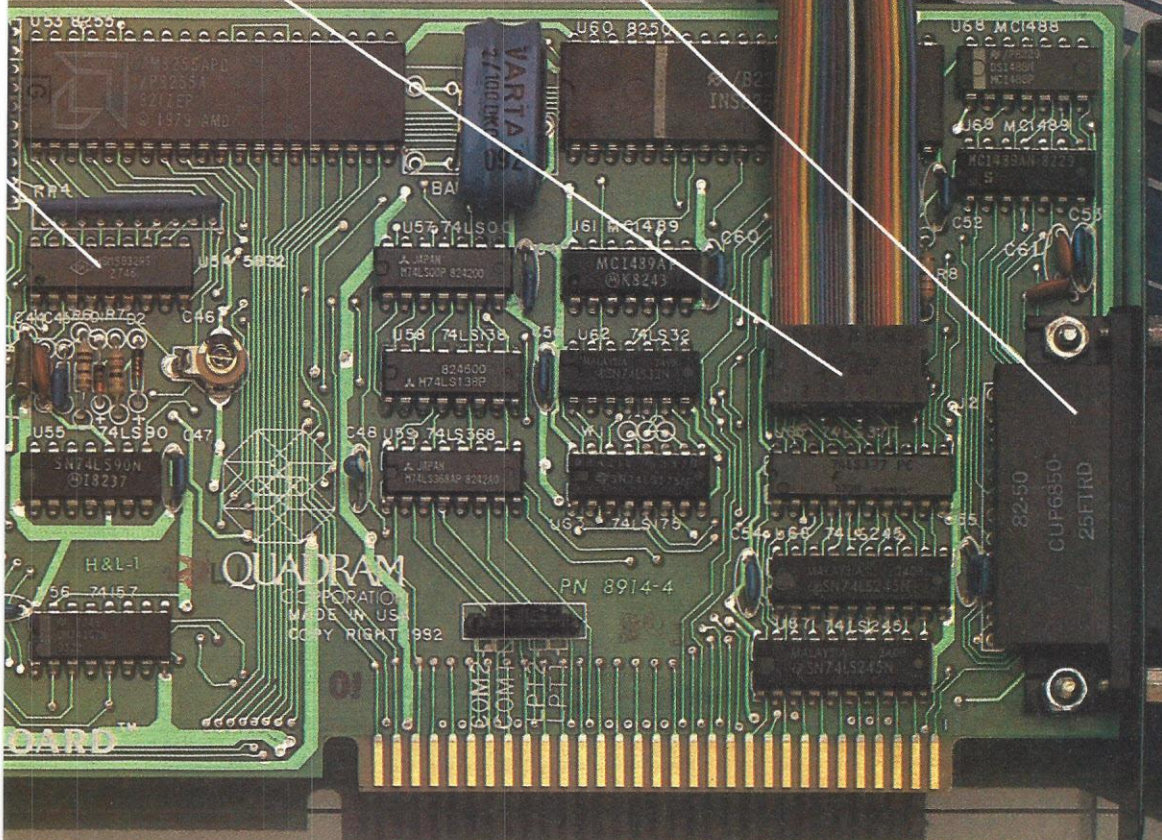
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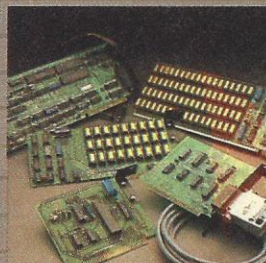
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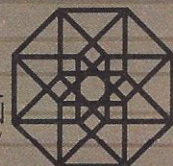
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(continued from page 38)

under different operating systems.

Operating systems come in successive versions, with new releases usually improving some problem area in an old release, or adding capabilities not included in earlier releases. Often there are different versions for different computers and/or microprocessors. Thus we have Apple DOS 3.3, an upgrade to DOS 3.2; or CP/M Plus configured for the Radio Shack Model 4, which offers concurrent processing; or CP/M-86 for certain 16-bit computers. Sometimes different versions of the same operating system create files which are incompatible with earlier versions, and which must be converted to run on the newer version of the operating system (or vice versa).

For most owners, most of the value of a particular operating system stems from the quantity, quality, and applicability of software running under that operating system on his particular machine. This can get complicated. Ads will claim that a given computer can run hundreds of programs because it uses, say, the CP/M operating system. However, VisiCalc running under CP/M on the Hewlett-Packard 120 will run on no other manufacturer's computer—even if that other computer uses CP/M—because the HP-120 version of VisiCalc has been adapted to the unique hardware configuration of that computer.

Some of the most common operating systems have been made technically obsolete by newer ones that run faster, take up less memory, handle hard disk drives well, and so forth. But the older operating systems often have far larger bases of applications software than the newer ones. Most owners are best off with at least one established system with mature applications packages; then newer operating systems can be added as needed—when you see an applications program you want that requires a specific operating system.

Q: I have an Apple II Plus system with Corvus hard disk storage. I need a program that will enable me to record stock portfolios and compare costs with current market values or with some market indicator. I am not interested in a modem or current Dow-Jones averages or predictions. What program do you recommend?

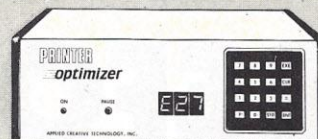
A: Corvus publishes a directory of Corvus-compatible software. To get it, write to: Inquiries Manager, Corvus, 2029 O'Toole, San Jose, CA 95131. The Corvus people say that any applications package using the CP/M operating system or UCSD Pascal should work with the Corvus hard disk. To run CP/M on the Apple you have to add an expansion card containing a Z80 processor. Microsoft, Micropro, and ALS sell such cards.

As to specific products that run on your Apple system as is, you might look into SMART, from Software Resources Inc., 186 Alewife Brook, Suite 310, Cambridge, MA 02138, (617) 497-5900. A CP/M package to consider is Analyst/Advisor from Kate's Computer Distributing Co., P.O. Box 972, Pacifica, CA 94044, (415) 332-9434.

Q: Can I interface my video-game machine, an Atari 2600A, with my home computer, an Atari 800? I'm interested in doing this because I would like to explore the contents of my game-program cartridges. I wrote to Atari, but they don't seem to care about my request.

A: Basically, you're out of luck. The Atari video-game machines use a different microprocessor, and are made by a separate division of Atari. However, most popular video games can be used on the computer, and tend to play a good deal better when booted on the Atari 800 than on the game machine. Why not give the game machine to your kid brother/sister and get into the 800, which is a good computer?

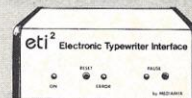
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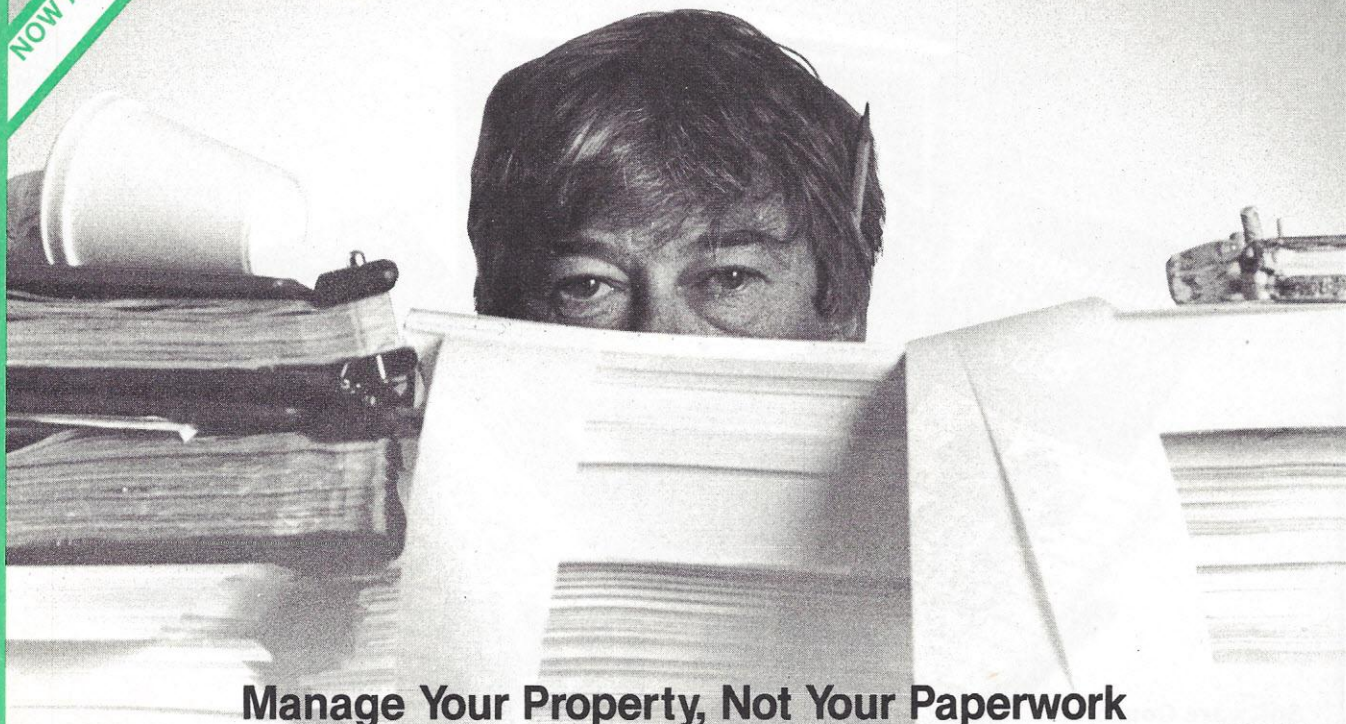
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Ronald Cole On Voice-Recognition Technology And Personal Computing

Imagine a robot in your home that responds to your verbal commands to "sweep here," "scratch there," and "cook this." Or imagine a word processor at work that recognizes your speech and transcribes your words complete with paragraphing and punctuation even as you dictate them. Science fiction has been populated by such devices for decades; popular movies such as *Star Wars* even give the impression that speech-recognition technology already exists (the android C-3PO was actually a linguist).

In fact, however, there are huge problems to be solved in creating a system that will distinguish between the sounds of the 26 letters of the alphabet, much less recognize a spoken vocabulary of several thousand words. There are even greater problems in making one system respond accurately to any human speaker, regardless of accent or conversational style.

Although voice-recognition devices for personal computers have been long and eagerly awaited, and the technology has been well-covered by the popular press, the news is: We're still not there yet. Nonetheless, with today's microchip technology, the dream seems to be beckoning now with more promise than ever. One of the centers of voice-recognition research is Carnegie-Mellon University in Pittsburgh, Pa. And one of the principal investigators there is Ronald Cole.

Cole received his Ph.D. in psychology from the University of California at Riverside in 1971, specializing in human speech recognition. He spent the first nine years of his career as assistant and associate professor of psychology, first at the University of Waterloo in Ontario, Canada and

later at Carnegie-Mellon. During that time he published some four-dozen papers on the way human beings understand speech. With the advent of personal computers and microchips, it was a natural extension of his curiosity to wonder whether machines might also be made to recognize human speech. In 1980 Cole joined Carnegie-Mellon's speech recognition laboratory as research computer scientist. Currently he is part of a team headed by

"Voice-recognition encompasses the technology of getting machines to understand speech"



Photos by Tom Barr/Black Star

Raj Reddy and Roberto Bisiani, which is trying to design a state-of-the-art speaker-independent speech-recognition system. In his conversation with *Personal Computing*, Cole outlined some of the reasons why universities and commercial concerns alike are interested in voice-recognition systems, and some of the principal challenges facing researchers today.

What is meant by the term "voice recognition?"

Cole: Voice-recognition encompasses the technology of getting machines to understand human speech. It's distinct from the field of voice-synthesis, which is the technology of getting machines to talk in human speech.

The field of voice-recognition really has two subcategories. One is speaker-recognition, the technology of recognizing who is speaking. The other is speech-recognition, the technology of recognizing what they say.

They're both potentially very important for computers, especially for security purposes. For example, if your system had both speaker-recognition and speech-recognition capabilities that were essentially infallible, then you could do financial transactions across banking networks and input your transactions by voice. The computer would allow only authorized transactions because it could verify both what was said and who said it.

What are some of the other potential practical applications of voice-recognition devices in personal computers?

Cole: One application is for the handicapped. *Time* magazine ran a story some time ago about a quadriplegic named Robbie Marince. He can't move a muscle below his neck, but he

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EXPANDABLE TO	96K	N/A	42K	N/A	32K	16K
BUILT-IN EXTENDED MICROSOFT® BASIC	YES	YES	ADDITIONAL COST	NO	YES	ADDITIONAL COST
BUILT-IN RAM	32K*	48K	16K	64K	16K	4K
EXPANDABLE TO	144K**	64K	48K	N/A	32K	16K
KEYBOARD FEATURES						
NUMBER OF KEYS	71	51	61	66	71	55
USER DEFINE FUNCTIONS	10	N/A	4	8	10	NONE
SPECIAL WORD PROCESSING	YES	NO	NO	YES	NO	NO
GENERATED GRAPHICS (FROM KEYBOARD)	YES	NO	YES	YES	YES	YES
UPPER/LOWER CASE	YES	UPPER ONLY	YES	YES	YES	YES
GAME/AUDIO FEATURES						
SEPARATE CARTRIDGE SLOTS	YES	NO	YES	NO	NO	NO
BUILT-IN JOYSTICK	YES	NO	NO	NO	NO	NO
COLORS	16	15	128	16	9	9
RESOLUTION (PIXELS)	256 x 192	280 x 160	320 x 192	320 x 200	256 x 192	128 x 64
SPRITES	32	N/A	4	8	N/A	N/A
SOUND CHANNELS	3	1	4	3	3	1
OCTAVES PER CHANNEL	8	4	4	9	8	10
A.D.S.R. ENVELOPE	YES	NO	NO	YES	YES	NO
PERIPHERAL SPECIFICATIONS						
CASSETTE	2 CHANNEL	1 CHANNEL	2 CHANNEL	1 CHANNEL	1 CHANNEL	1 CHANNEL
AUDIO I/O	YES	NO	YES	NO	NO	NO
BUILT-IN MIC	YES	NO	YES	NO	NO	NO
DISK DRIVE CAPACITY (LOW PROFILE)	256K	143K	96K	170K	N/A	170K
CP/M® COMPATIBILITY (80 column programs)	YES	NO***	NO	NO****	NO	NO
CP/M® 2.2	YES	NO	NO	NO	NO	NO
CP/M® 3.0	YES	NO	NO	NO	NO	NO

* 16K user addressable plus 16K graphic support

** 128K user addressable plus 16K graphic support

*** Apple II can accept modified 40 or 80 column CP/M

**** Commodore 64 accepts 40 column CP/M

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uses a voice-recognition box to control his television, his satellite dish in the backyard where he's able to receive the different satellite cable TV channels, and other devices in his home. Now he's able to go to school and run a Betamax machine to review his lessons, answer the telephone, and make telephone calls—all by voice control. So here's a case where current voice-recognition technology has dramatically affected a person's life.

Another application is word processing. Word processing is basically typing, but with a lot of extra commands. Some of those commands require you to hit three or four keys in a particular sequence. If you could replace all of those commands by speaking "scroll 10 lines" or "paragraph" or "end of file" into a microphone sitting in front of you, that would make your word processor much faster and easier to use.

I can also imagine that in a few years videogames could be voice controlled, so that kids could launch themselves into imaginary hyperspace just by voice command.

You mentioned current voice-recognition technology. What is the state of the art today?

Cole: If you have a small vocabulary consisting of words that don't sound alike, then we can build systems today that will recognize those words with high accuracy in a speaker-independent or speaker-dependent mode. Speaker-independent simply means that the device will respond to anyone who talks to it, like a human being does, whereas speaker-dependent ones do not.

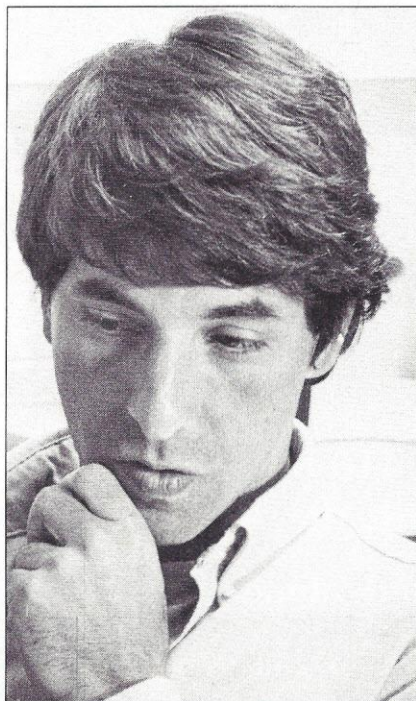
Some speaker-dependent systems are available for personal computers today. The only one I'm really familiar with is the one made by Scott Instruments, which is the one Robbie Marince uses, although there are others. With this system you put in up to 40 different words. You say each word three or four times, and it creates an average template—a kind of

numerical snapshot—of the sound. After you put in each of those words you can then say any of them and the system will compare that word to each of the templates in memory. It compares them very quickly, picks the closest match, and that'll be the word it recognizes. If none of the words match closely, it'll say that it couldn't tell what word it heard.

That basic approach of putting patterns into the memory of the computer and then matching new sounds to those patterns is called template matching. That is the technology of all systems now commercially available. Those systems will work very well if the words don't sound alike.

If the words sound alike, like the

“Videogames could be voice controlled, so kids could launch into hyperspace by voice command.”



letters of the alphabet, no current system will perform well. In fact, just with those nine letters of the alphabet that have the “ee” sound—b, d, g, e, t, c, v, p, z—current systems will correctly identify the letter about 60 or 70 percent of the time, maybe worse. Maybe only 50 percent of the time. But if you put in words like Chicago, Minnesota, New York, then they'll do fine. If you put in digits you can also get very good recognition, although there are some similarities between the numbers one, five, and nine.

What's your particular interest in voice-recognition research?

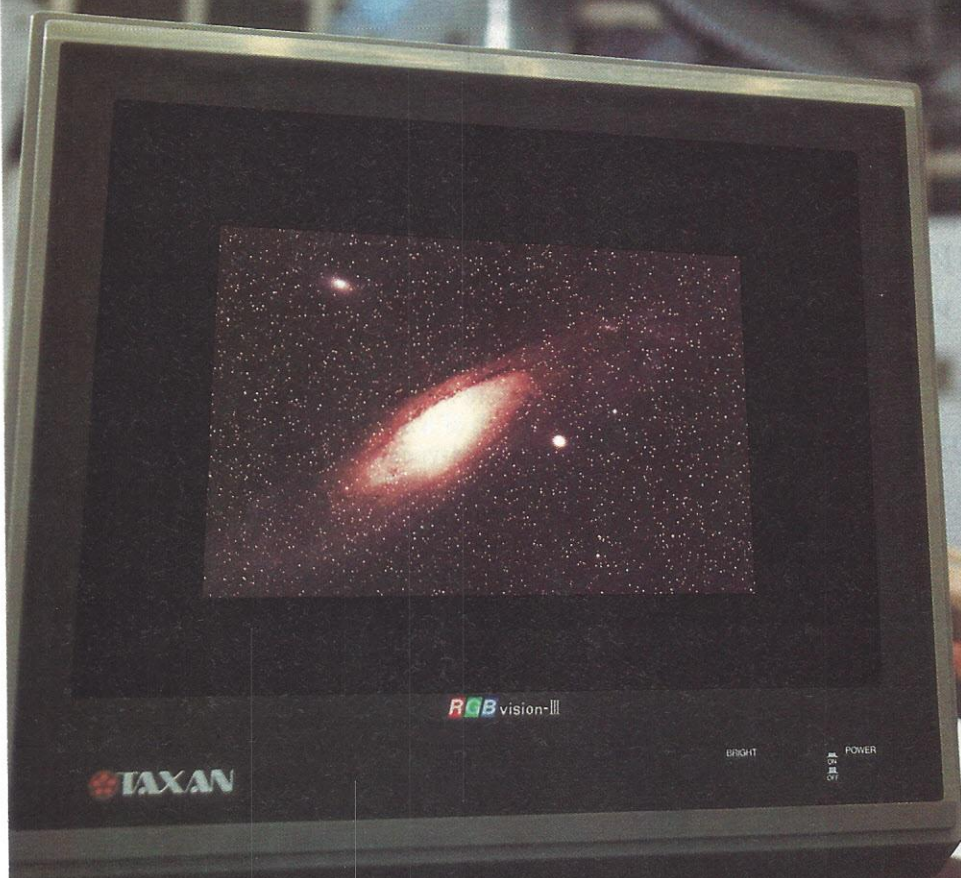
Cole: I'm attempting to help solve the fundamental problems that will lead to the voice-recognition systems of the future. There are several fundamental problems yet to be solved.

One is the problem of making a system speaker-independent so that each user won't have to repeat each word he's going to say into the system before he uses it. While that's not too much of a difficulty with the current limited-vocabulary systems, for a large-vocabulary system the problem is enormous. Practically speaking, you can't have every new person come up and say each of 1000 or 10,000 words several times to put those patterns or templates into the memory.

Another fundamental problem is to build a system that can make fine distinctions between words and sounds that are most similar. No one has yet solved the problem of being able to perform such fine phonetic distinctions. The term “fine phonetic distinction” is the basic phrase I use to highlight the challenge of being able to discriminate between those phonetic segments that make up the words of our language. One can take most words and by just substituting the sounds find many pairs with similar sound. For example, the word “bit” consists of the “b” segment, the “i” segment, and the “t” segment. But if you substitute different con-

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sonants and vowels, you'll get many words that sound quite similar: "bit," "pit," "bet," "bid," "bib," and many more.

This problem is not limited to individual words. A continuous stream of speech consists of these phonetic segments, and each segment could be confused with five or six other similar segments. So you can see any one of those confusions might cause a different word. You want to have a computer system that is powerful enough to take a continuous stream of sound and identify the correct sequence of words. It's usually the case that you can find more than one sequence. For example, consider the ambiguity between "more ice" and "more rice" or between "she fed the cat a tonic" and "she fed the catatonic." We haven't even scratched the surface of those kinds of problems. We have to build a system that can deal with ambiguity and error at all levels.

How necessary is it to solve the problems of speaker-independence or fine phonetic distinctions for voice-recognition systems for somebody's personal computer?

Cole: If all you need is a small vocabulary of different-sounding words, solving those problems is probably not that important to you. But as you increase the number of words, template systems tend to increase in recognition time and required memory. And if the vocabulary you need to use has words that sound similar, then today's template-matching technology is not adequate and the problems become critical. So past a certain point, which you reach very early, there are still practical considerations that make template-matching systems bulky.

There's a convenience factor as well. With current technology, you can't just buy a system off the shelf and use it without first training it to your voice and way of speaking. And if several people are going to use your computer, as they might at work, each user has to go through that. It's

less convenient than if anyone—such as temporary help—could go up to any machine in the office and be able to use the machine without training it. *Would a large-vocabulary speaker-independent system allow this interview to be transcribed even as we are speaking?*

Cole: You've just asked a very good question. That is our goal in speech-recognition research. We consider that when we have built an automatic dictation machine, it will be an existence proof that we have now solved the problem of computer speech-recognition. An existence proof is something you can point to and say, yes, they've done it, they've succeeded. It will require that any speak-

“We have to build a system that can deal with ambiguity and error at all levels.”

er can walk up to the system, and say any set of sentences; the system will be able to recognize the words in the continuous flow of speech, use meaning to distinguish between the various phonetic segments, use intonation to make pauses and know how to punctuate it, and recognize the specific words. It will have to have a great deal of knowledge built into it.

This all sounds as if it will take a lot of memory space. Personal computers have 256k memory maximum for the largest systems, and usually more like 64k. Might that limitation in memory restrict what might be available in speech-recognition for a personal computer?

Cole: No, there aren't any limitations here. Perhaps the biggest reason is there's a new technology that's coming along in speech-recognition re-

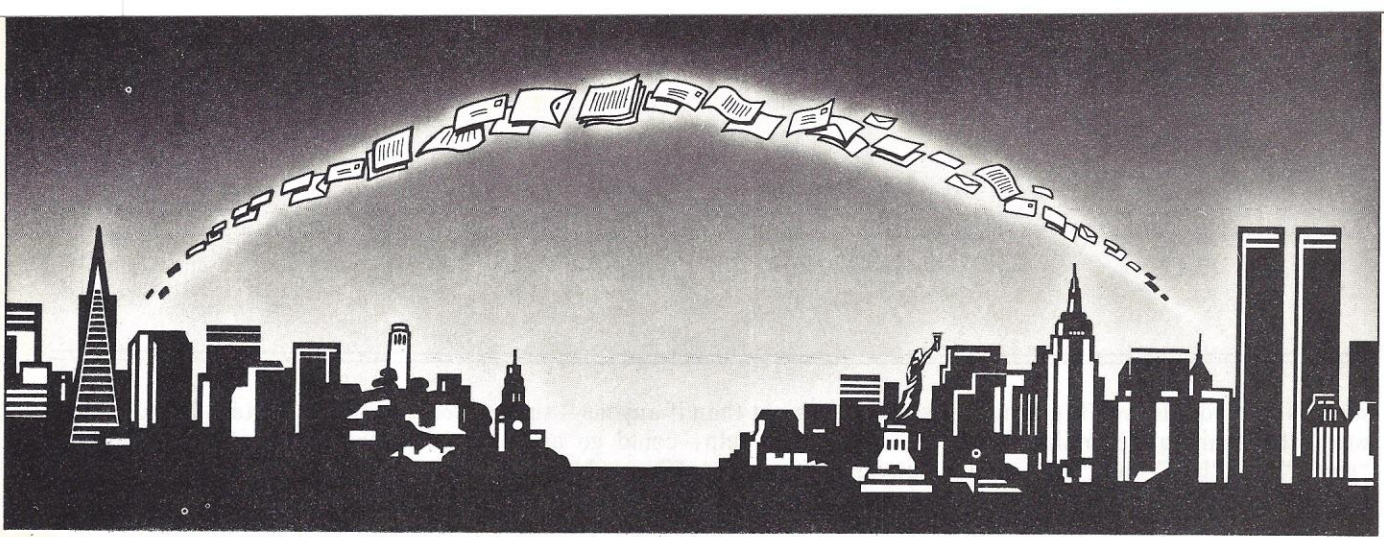
search, called feature-based recognition. Instead of storing templates for each word or each sound and then matching each spoken word with the templates in memory, with feature-based recognition you try to identify words by identifying their phonetic components. In memory you have a description of phonetic sounds in terms of a set of features or properties. It'd be like saying "an 's' sound has high-frequency noise and it's so long" or "a 'p' sound has silence, and then it has an abrupt onset," and so forth. All you'll need in memory is the descriptions of each phonetic feature, a dictionary of actual words, plus a phonetic spelling for each word depending on its features—perhaps several phonetic spellings for alternate pronunciations.

Feature-based recognition will be a powerful technology. For one thing, the phonetic features will give you the pattern for that sound no matter who says it. It'll also allow for large-vocabulary systems without having to enter and store individual templates for 1000 or 10,000 words in memory. It'll also be faster because it won't have to match each spoken word with each template in memory, but will be very flexible and intelligent in the way it identifies features of words. It'll work much more like the human brain.

Do you think that elaborate speech-recognition systems such as the ones you envision will be available for personal computers?

Cole: Without a doubt. Now, in my field we don't worry about how long it takes to develop a system, but what it takes to get there. Really, I am confident that by the time there are speech-recognition systems that can perform like humans, that the technology will be there for us to be able to put them in boxes the size of typewriters.

So basically your research is proceeding on the assumption that the technology will be catching up in a parallel way, and will be ready by the



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time you researchers have achieved your goal.

Cole: Absolutely. It's a safe assumption. Let me give you an example. We have a big mainframe computer that cost a couple of hundred thousand dollars, and we have another computer attached to it that lets us do things even faster than the big computer can. And it still takes us about 10 seconds, with all this computer time, to recognize a letter of the alphabet. Right now, today, we could build a little chip set that could do that recognition in real time. And once that original chip set has been built, you could manufacture them very cheaply. *If that's true, then why aren't those chip sets being built?*

Cole: Because we have not yet achieved the accuracy in our own system where anyone would want to turn it into a product. But once we have, and someone did want to—and that's not our concern—our code and algorithms and research are public domain: Anyone who wants to come in is welcome to all that we know. But when we have a system that will recognize the letters of the alphabet with only 1 percent error rate, and someone wants to use that system for whatever reason, the technology would be there for them to make it into a chip.

Do you know of anyone watching the progress of your research who might be interested in doing that?

Cole: These aren't dummies out here in the industry world! I was at the conference of the IEEE (Institute of Electrical and Electronic Engineers) in Boston in the middle of April. Something close to half of the people were from private companies. And they're listening to papers by the academics, who tell all they know about what they've done, and these industry people can take any of these ideas and incorporate them into their own product. So there sure is interest, and people are looking.

Do you have any sense of the kind of market demand for voice-recognition

on personal computers? Do you know whether people are interested in having this kind of a feature on their own computers?

Cole: The situation is this: There are speech-recognition companies starting up all the time. Those start-up companies get money from venture capitalists and other places because they've done feasibility studies on the field. And that money comes. So clearly there's a market out there. But these people don't tell what their feasibility studies show, because that's all proprietary. The fact that there are companies starting up and doing research and being funded means there are a lot of people who believe there's a market.

“Speech recognition by computer is going to have as much impact on our lives as the telephone.”

Now, I happen to believe that speech-recognition by computer is going to have as much impact on our lives as the telephone, television, or anything else, and that right now it is a market begging for a product. The world is now laced with computers.

The most natural way to communicate that humans have is by speech—not by typing. When speech recognition comes into its own, that's going to be the way people communicate with computers.


How soon do you think speech-recognition might be available commercially for personal computers?

Cole: That pretty much depends on the complexity of the task you want the system to do. Basically we're talking about the evolution of a technology. First, you'll probably start seeing systems that will handle lim-

ited tasks, such as recognizing spoken digits. You can imagine that banks and accountants with personal computers might find it useful to be able to have voice input with connected digits with some command words. People might also buy numerical speech-recognition systems for voicemail of telephones and paging systems, computer networking input of data. I think you'll see those kinds of systems coming out in the next two to three years.

You'll also probably see systems that can use between 10 and 30 words with fairly high accuracy in speaker-independent mode in the next two or three years, which will be cheap. They have those kinds of systems now, but they're expensive. When I say cheap, I mean under \$100. Systems now are maybe 10 times more expensive.

Technology that can handle tasks with larger vocabularies of highly confusable words is going to take longer. We still need technological breakthroughs, we still need to be able to extract the features more accurately than we do, and we need a little bit better programs to take the features and decide what was said before we can build systems for large vocabulary. Also, we have no idea yet how to get the computer to listen to one person when there is a babble of voices in the background.

The potential for speech-recognition should be emphasized, because at some point it's going to be a completely natural thing. A lot of people think it's here already, and it certainly isn't. There are limited-vocabulary, speaker-dependent systems that work fine; those exist today. But people see *Star Wars* and they see people talking to R2-D2 and they think that computers can do that already, when in fact we're a long way from solving that kind of problem. It's really a matter of requiring those essential research breakthroughs and hard work—work that's going on now. 



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Buying Your Second Computer

The second computer is fast becoming part of the American landscape. Why are people buying them? What should you look for in a second computer?

by Michael Rogers, Senior Editor

So you've started to think about a second computer. What's more, you're beginning to come up with a list of what seem to be real reasons for buying a second machine—not just excuses for a slightly newer piece of hardware. You haven't, however, told anyone else yet, because it was difficult enough describing why you wanted your first one. So, just how crazy are you?

Not crazy at all. There are plenty of good reasons to buy a second computer. It is rapidly becoming a common occurrence, and in the pages that follow, we'll see just why. Everything from business considerations to one's own family situation can justify—indeed demand—the purchase of a second computer. With second computer systems come additional rewards, and additional considerations as well. The trend has already started, and by looking at some specific examples, as well as examining some basic motivations, it's possible to come up with some good reasons and guidelines for making your own second computer purchase.

For starters, you're not going to be alone. The news of just how much company you've got, in fact, surprised both seasoned poll-takers and the jaded computer watchers at this magazine. An extensive polling of *Personal Computing* readers revealed that a remarkable number of current computer owners are already

planning to purchase their second computer. The figures are impressive: Fully 40 percent of our readers who have a computer—many of whom have owned the machine for less than a year—are already far enough along in their deliberations on a second one that they have a good notion of what brand they're likely to buy. As one observer pointed out: "A second computer in less than a year. How long did it take before the two car family became common?"

That's not all, as it develops. These individuals, many of whom already own fairly expensive computers—Apples, IBMs, TRS-80s—aren't planning to skimp on their second purchase. While some industry pundits have predicted that personal computer owners will buy far less expensive, more home-oriented units as their second machines, that doesn't seem to be the case. In fact, over half of those who plan to buy a second computer intend to purchase a system that will cost, on average, about \$3000.

There are many answers to the question why people buy more than one computer, but in general it seems to break down into two primary motivations: an effort to duplicate one's business computer setup at home, and the desire to provide computer access for the family.

These two divisions, however, raise many questions. Do you necessarily

want to precisely duplicate your working environment at home? Can you maintain software compatibility, yet gain additional features that make more sense in the home? If you're buying a computer for your family, will one be enough? Do you want a home computer with the same operating system as your office machine—or will you want some technologic barrier to keep the kids' battles against aliens away from your second quarter spreadsheet? Even if the prospect of a second computer currently seems dim to you, read on—the following examples may well kindle a spark of recognition in you.

Christmas money

Janet Ellison, a sales representative at Quest Computers in Oakland, Calif., reports that an increasing number of her clients are buying second computers. "Most of the situations involve either having one in the home and buying another for the office, or vice versa. A common situation is when a wife or husband likes the personal computer so much that they take it to the office. Generally, in a replacement buy like that, they tend to get the same kind—if it's an Apple in the home, they'll buy an Apple for the office."

How about expanded use of a home computer by other family members?

"It's common," Ellison reports.

With second computer systems come additional rewards, and additional considerations.

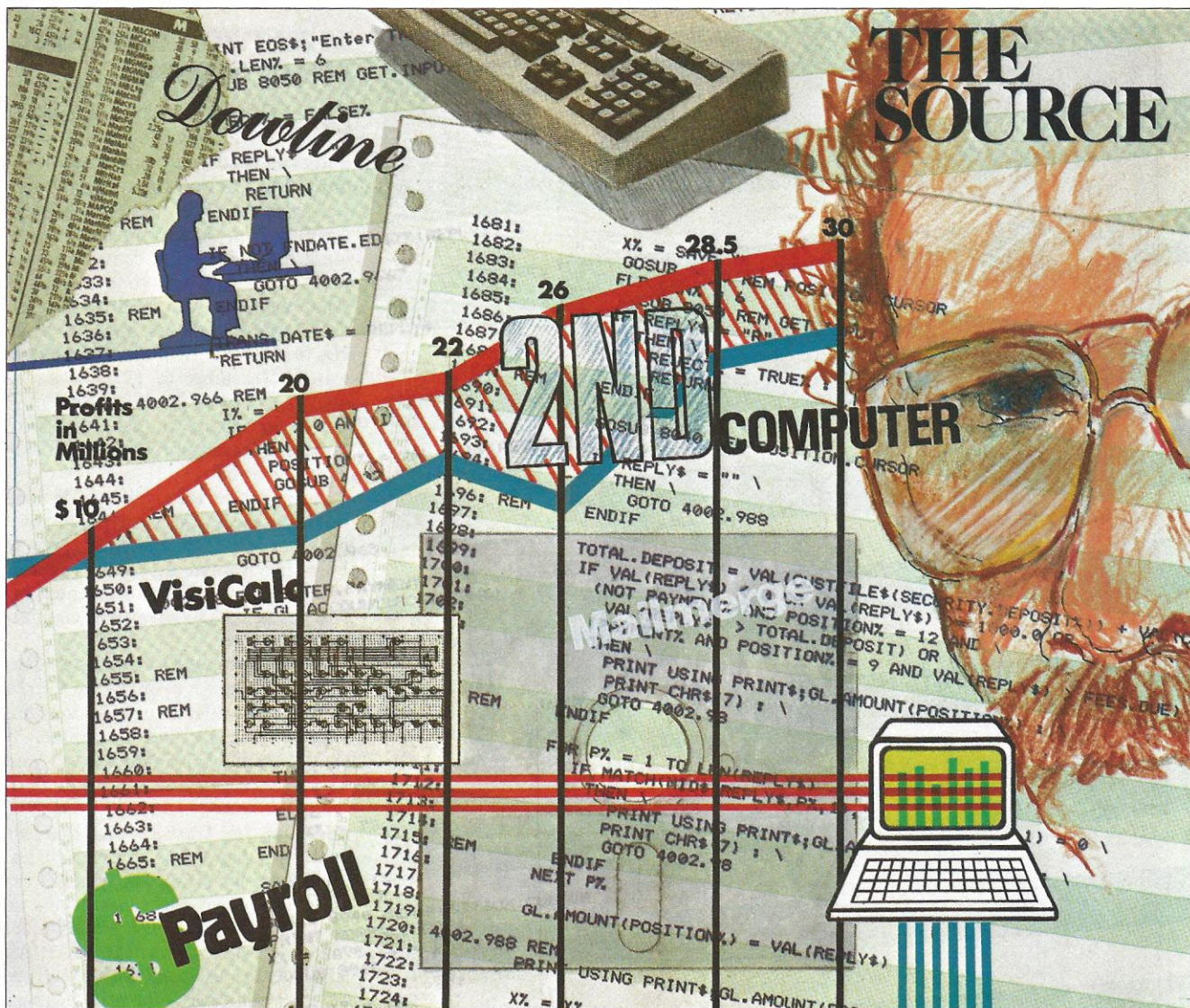


Illustration by Robert Bryant Associates

"What happens is that more than one person in the family begins to want access to the computer. As people become more knowledgeable about what the computer can do, they ask themselves 'what else?' They start to accumulate more software, and more people in the family want to use it. Eventually, they'll be ready to expand to a second system.

"A recent example in our store is a couple who bought an Apple II for Christmas. The husband is an attorney and the wife is a schoolteacher. And the reason they bought

a computer in the first place is that the grandparents sent Christmas money to buy one for the children. The parents didn't know anything about computers; I think the only software they had originally was Apple Logo. But now the husband wants another Apple IIe for the office, so he can share text files with a friend who has an Apple III. And he wants to use both of his Apples, at home and at work, to run VisiCalc."

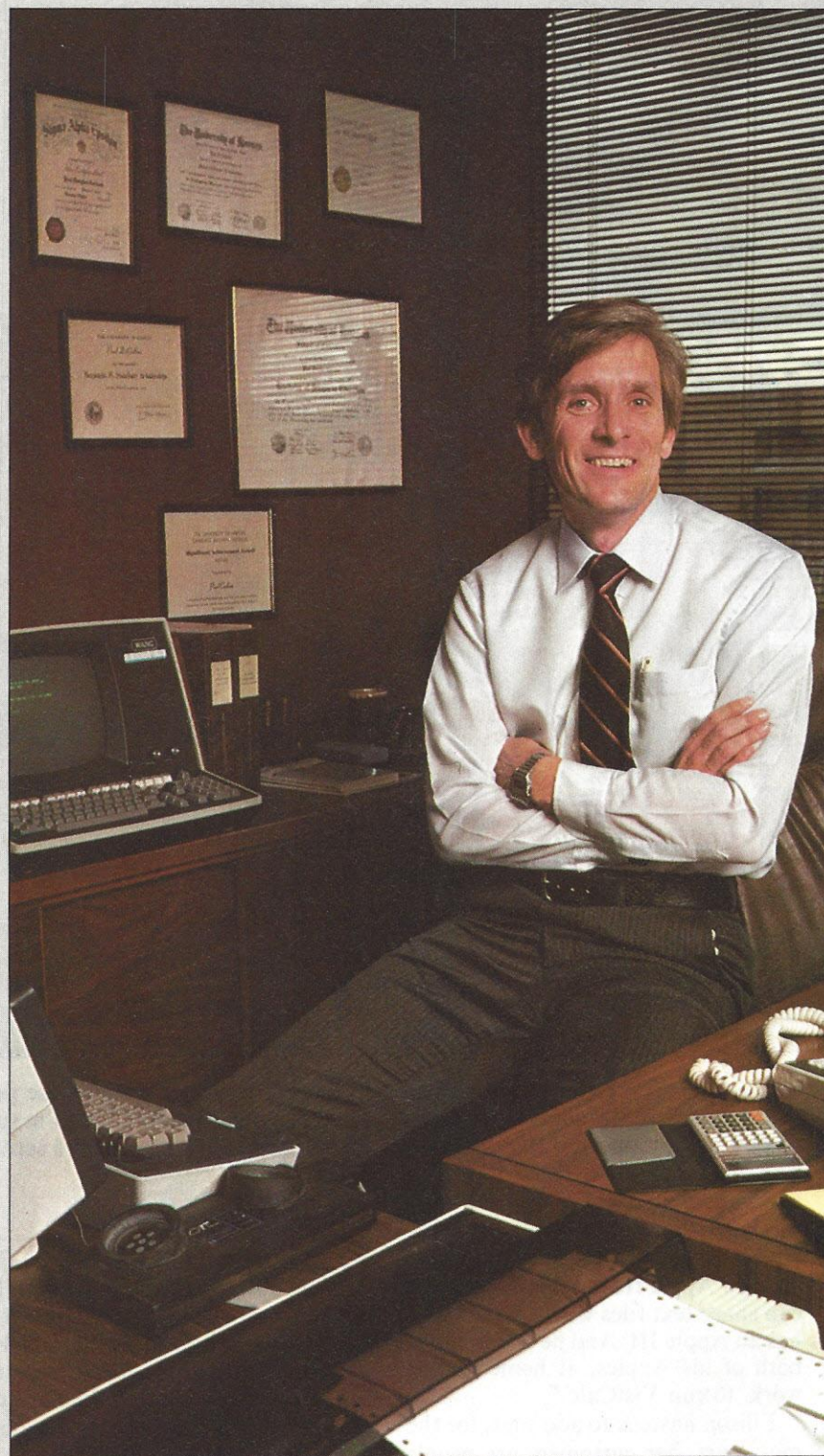
Ellison hastens to add that, for the most part, her customers are people just buying their first computers.

"But people are learning to use personal computers so fast, that I'm sure lots of them will soon opt for a second system."

Two, then three

Jeff Voorhees, an architect in Des Moines, Iowa, recently purchased his second computer. His first is a TRS-80 Microcomputer Model II, which is used in his office for general accounting and word processing. In addition, Voorhees uses VisiCalc for financial forecasting and modeling.

"When we first got the office com-



WHEN TWO COMPUTERS AREN'T ENOUGH . . .

Paul Carlson is a good example of just how easily the personal computer can become an important tool in one's life. Carlson runs Plan Design Consultants, Inc., in San Mateo, Calif., a firm that administers retirement plans for small companies and professionals. Carlson is a former IBM employee who became involved with large computers back in 1968. His first contact with small computers was in December of 1979, when he bought a Vector Graphics System B for his company to go along with some proprietary software for pension administration.

A year after that, Carlson decided he could use a computer for his own purposes, so he bought an Apple II Plus. He wanted to learn programs like VisiCalc, and he also wanted his two young sons to have some computer experience.

Carlson expanded his basic system by adding more memory, a CP/M card, and a collection of software including VisiCalc and WordStar. "I used it so much," Carlson says, "and became so dependent on it that I absolutely wanted to have it around." The difficulty for Carlson was that his home was more than an hour's commute from his office—he couldn't exactly run down the block when he wanted to use the Apple. His solution, "rather than spending another \$7000," was to spend \$450 on three big carrying cases—for printer, monitor, and computer—along with a handtruck to get all of that equipment from house to car trunk and back again.

"After a year or so, I got tired of packing it up," Carlson says, "and the family got tired of not having a computer around when they wanted it. I decided to leave the Apple at home and buy an Osborne for myself. Now, it's with me at all times. Like many people, I usually work on my personal computer in the evenings and on weekends, and my wife and kids pretty much have the Apple to themselves now. The boys use WordStar for

Photo by Lee Youngblood

More people using the office system meant less computer time for Voorhees.

homework, and my wife uses it for correspondence and a nutrition program."

Next in line for another computer was Carlson's office, and this time he didn't fool around. "We bought a Wang MVP2200," Carlson says, "which is about a \$50,000 mini-computer with four terminals and a 20-Mbyte hard disk." The Wang is used for the specialized pension administration tasks, but Carlson kept the Vector Graphic as well, to do word processing.

"Those four are it for now," Carlson says, although he doesn't plan to stop there. "What I'm going to do is sell the Apple, upgrade my current Osborne with double-density drives and an 80-column card, and leave it at home. Then I'm going to buy the new Osborne Executive for my own use."

"I regret losing the color and graphics capability on the Apple, but my family will still have WordStar on the Osborne. I'll buy them some games—or maybe a better idea is to let them run their games on their Atari game machine. And I wrote some programs for the Apple, but they're in M-BASIC, so I can convert them to run on the Osborne."

"The key thing I'm moving toward is compatibility. When you get hooked on computers, you want them right at your fingertips. It could be a portable—but that's kind of a hassle sometimes—so I'd rather just have two and carry the diskettes back and forth. If I were starting out fresh I'd probably buy something like an IBM Personal Computer and a Compaq."

"If there were more people like me," says Carlson, "the personal-computer industry would be even richer than it is now." But he seems to be doing his best to help things along. He plans to start a new program for his 10 employees. "If they want to buy an Osborne, and they use it at the office during the business week, the company will essentially pay for half of it. They finance it, and we pay them \$50 a month rent, which should cover half of the payment. So, we'll probably end up with about three more Osbornes in the office as well."

puter," he says, "I was about the only one who used it." But with general accounting on the system, the bookkeeper began to use it heavily. Voorhees's secretary took a bit longer to adjust. "She didn't want to use the computer at first," he says. "But I insisted. It took her a while to learn, but now she has discovered how productive she can be, and she's on it all the time."

The result of more people using the office system is that there is less computer time for Voorhees. So last Christmas, he bought an Apple II for his home. "I bought VisiCalc for the Apple so I could do financial forecasting at home instead of working nights at the office," he says.

In addition, he chose the Apple so his children could become involved in computing, too. "Their school," he explains, "had an Apple, and I thought it was a good idea to buy the same kind of equipment."

Buying up

As far as his children are concerned, Voorhees's investment seems to be paying off. His son Tyler, 10, has already learned how to program, and his daughter Cindy, 14, was so enthused about using the computer that she enrolled in computer classes in high school—classes, Voorhees says, she might otherwise not have taken.

While the amount of computer traffic at home hasn't reached the point where Voorhees is contemplating the purchase of a second computer there, he does plan to buy a third machine for the office. "We are going to purchase another TRS-80 just for word processing," he says. "Personal computers are kind of habit-forming. You just can't walk by one without wanting to sit down and use it."

Charles Thomas, a free-lance magazine writer in Los Angeles, reflects the trend toward choosing a more expensive computer the second time around. His first computer was a

VIC-20. "I bought it as a learning tool," he says. "For one thing, I was curious about computers in general, and I knew that sooner or later I was going to end up writing about them. Secondly, a number of writers I know already had computers for word processing, and I knew that was something I wanted to get into. But first I wanted to learn the basics."

Thomas used the VIC-20 for nearly four months, playing games and learning a small amount of BASIC, and even buying a simple word-processing program called Quick Brown Fox (although he purchased neither a printer nor a disk drive for the system). "During that period I did quite a bit of reading," says Thomas, to go along with the work on the VIC-20, "and finally I felt very confident that I knew what system I wanted, based on my own experience as well as the advice of friends." Thomas bought an Apple IIe system with a letter-quality printer, and chose Applewriter II as his word-processing program. He is, however, keeping the VIC-20. "Over the course of the last few months, I bought enough software—especially games—that it's worth keeping. Especially for games. I have it connected to my color TV, and the Apple is connected to an amber monitor, so as far as game graphics are concerned, the VIC is better. And if I get tired of it, I can always give it to a friend's kids or something. But for now, it's convenient to have two."

Home work

Jim Levy is a small-business systems computer analyst in San Francisco. His office is equipped with an IBM Personal Computer and various peripherals, which he uses for word processing and some financial spreadsheets, as well as demonstrations for his clients, who tend to be small-business owners just beginning to computerize.

Levy recently bought a second computer, and unlike the majority of

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There is also the question of what to do with your first computer.

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individuals in the survey mentioned above, he chose to purchase a far cheaper machine than what he's accustomed to at work. Levy bought a Radio Shack Color Computer for home use. He had several reasons: He wanted a computer at home for light word-processing tasks, such as letter writing, as well as limited financial management. The available Radio Shack software seemed to fill those needs. But more important, he wanted to give his two children some hands-on computer experience. He wanted a fairly inexpensive computer his children could use without fear of damage, but one which he could work with himself. And he was definitely not interested in duplicating his working computer setup at home. "When I'm at home," Levy says, "I don't necessarily want to be able to do everything I can do at work. There are times when I'm glad to have an excuse not to work."

Questions to ask

Just as when buying a first computer, one of the initial questions to ask regards software availability. What are your motivations for purchasing the second machine, and what sort of software will you require?

Obviously, if you're buying the computer to duplicate your setup at work, you're going to want a machine that runs the same software. You'll want to be able to pull a data diskette from your office machine and use it at home. If this is what you're looking for, then you clearly don't want to buy a machine that uses some unusual proprietary software, when you have a standard IBM Personal Computer at work.

This needn't mean that you're limited to buying the identical IBM for home—and this is where the question of compatibility comes in. In the case of IBM, for example, compatible machines like the Compaq can be a good alternative, and may offer additional advantages for the home environment—portability, for instance. A

portable machine can be set up on the dining room table for an extended stint of work, then stored away in a closet when not actually in use.

Our survey revealed that more than half of those shopping for second computers have children at home. Desire to provide computer literacy for the family is a major factor in their purchases, and so it makes sense that they would lean toward machines with considerable educational software available. And entertainment software, as well, can be important for making kids and adults comfortable with computers. While you needn't base your selection exclusively on how many arcade games per month are being released for each machine, it should be clear that there is some family fun available.

You may be considering a computer as a replacement for, rather than a supplement to your old one. If this is the case, you're probably wondering what to do with your first machine. Used computers can be sold, of course, and used-computer flea markets and classified papers are becoming more common. But the dollar value of most personal computers drops rather rapidly, and it's worth considering whether even greater value, in the form of computing time for family and friends, can be gained by holding on to the older machine.

The old one

Computers can also be donated to educational institutions, making a tax deduction possible; the amount deductible is based on the current market value of the machine, however, and again it's worth balancing the bottom-line tax savings against the value you may personally still find in the machine. Before donating the computer to an educational institution, it's worth considering whether there's anyone in your own family who might get just as much—or more—educational value from it.

Or consider dedicating the older computer to a single purpose in the

home—education or entertainment, for example. Many people find that the first computer, when displaced by a more powerful machine, is still useful as an entertainment device, permanently connected to the color television in the living or family room.

How big?

One common choice for a second computer may increasingly be the lap-size portable, since it can be carried in a briefcase and used during travel. Part of this story, for example, is being written on a TRS-80 Model 100 briefcase-size computer on a plane 40,000 feet over the Midwest. Later, the text files will be loaded into a larger computer at home, for editing with a more powerful word-processing program. Small "true" portables like the Model 100, the Epson HX-20 and the TI Compact Computer (with more soon to come), may be logical second-computer choices for frequent travelers—because their power is greatly expanded by having a larger computer plus peripherals at home.

Larger portables—ranging from the Osbornes and Kaypros through the Compaq, the DOT, and others—are useful for moving from room to room in the house, or from office to office, and they provide more convenient storage than machines with various peripherals. They can be particularly useful for people with second residences—weekend homes, for example—where one doesn't want to keep a computer full-time, but where one spends enough time to want a more powerful and versatile machine than the briefcase-size portables.

Finally, it's becoming clear that, as prices drop, for some individuals the second computer is becoming an alternative to buying a portable. By having the same, or compatible, machines at two different locations, all one needs to transport are program and data diskettes—unquestionably portable objects.

(continued on page 163)

Taking The Guesswork Out Of Cost Estimating

With computerized cost estimating, you can make sure your bids are right on the money

by Elli Holman, Associate Editor

Wherever there's a job to be done, from building an interstate superhighway to reseeding a front lawn, there's a need for someone to sit down and figure out how much it's going to cost. This task, traditionally the domain of pencil, paper, and calculator, is long, tedious, and prone to error.

But it doesn't have to be. Now, cost estimating can be done faster, more accurately, and with a lot less hassle by using a personal computer and software dedicated to this task.

The person responsible for figuring costs before a job is started is commonly referred to as an estimator. His job is to look at the plans of jobs the company is contemplating bidding on, and come up with a figure that reflects what it is going to cost his company to do the work.

In many large companies, the estimator is someone whose sole function is to bid on jobs. But in smaller businesses, the person responsible for finding new jobs and offering his company's services is often one of the firm's owners or its president.

Being competitive

The trick in estimating is to make your bid as competitive as possible while still reflecting your real costs. There are many ways to go about this—some are proprietary to particular firms, while others are pretty standard in any given industry.

Some of the more obvious applications involving cost estimating have come out of the construction industry where job bids are formalized, complicated, and exact. In many cases, such as the construction of a suspension bridge or an interstate highway, a job bid could involve as many as 1000 different steps from pouring the tar, to putting up guardrails, to planting grass along the road.

When an estimator has to figure

out a price for each of these 1000 different items, or even 50 items, the luxury of computer storage becomes an important ally in the bidding process. The estimator can work on several bids at a time without worrying about losing that one piece of paper containing important pricing information. This helps in avoiding many of the mistakes inherent in developing a bid, as well as reducing the time involved.



Ed Fares, president of Garrison Construction, has found his cost-estimating package very useful. "It is set up pretty much the same way I always bid before I had a computer."

The trick is to make your bid as competitive as possible while still reflecting your costs.

And time is an important factor in cost estimating. Often a job bid is being developed right up to the proverbial eleventh hour. Materials suppliers, also jostling for the job, are cutting their costs and fighting with others for their parts of the job. So, being able to change pricing figures without having to recalculate the entire bid is an important benefit of using a personal computer to do cost estimating.

What the professional estimator really needs is a finished document which breaks down his costs for labor, equipment, and materials, adds in his profits, and gives him a total price for the job.

Taking the next step

Gene Murrow, president of Computers For Construction in Ardsley, N.Y. saw a need for a cost estimating package aimed at the small construction firm. With his extensive background in both the construction and computer industries, Murrow believed he could offer his customers more than what was already available in the personal computer software market. With this in mind, he developed a series of software products using dBASE II data-base-management software from Ashton-Tate in Culver City, Calif. One of Murrow's packages is called Cost Estimating System.

Murrow used dBASE II to develop his package because of what he calls its "organic development" features. "Normally in a software project you have to lay out in advance, and in great detail, every aspect of the system—especially the file layout," he says. "And if you find out in your early testing, or in experiences with customers, that you goofed, it's very difficult, if not impossible, to change it without having to do a total rewrite.

"dBASE II allows you to do a rough cut of the system and test it by getting it out to the customers to see how they respond," he continues. "If a customer says, 'Well, I really would

like to have the item name a little bit longer, or I'd also like to add the following information, or, while we're at it, it would be very convenient if I could also type in such and such,' dBASE allows you to go in and very, very simply add that information to the files without losing the data you've already entered and without rewriting any of the program."

Murrow says his package is aimed at "whoever does the bidding or estimating for a construction firm. In construction we include everyone—from the people who build bridges, highways, and large office buildings, to two brothers with a truck who do gardening."

Some of the comments Murrow has heard from his customers included, "The thing about this program is that it seems to be designed for construction people . . . It really seems to have been written by a construction person."

This is exactly how Ed Fares, president of Garrison Construction Co. of Monroe, N.Y. feels. "We found that what Gene Murrow has done has been very useful because he's approached it from the estimator's point of view. Basically, the way the cost estimating package is set up in the computer is pretty much the same way I always bid before I had a computer."

Fares's company is a small construction firm, with three people working in the office, two people in the field at project sites, and as many as 30 employees hired during the year to work on specific jobs. "We are primarily excavators," he says. "We bid and do work on municipal sewer projects, water projects, sidewalks, curbs—anything from the ground down."

A tool for problem solving

Fares had several problems he hoped to solve by purchasing Murrow's system. "We were looking for something that would allow us to keep better track of our cost records," he says.

"Since the beginning of our company we've kept an eye on our costs but we've always done it in terms of a total picture of a job. We never really had the opportunity to check productions on various items as we go along."

A personal computer seemed the perfect solution to these costing problems. "We were thinking about getting a computer when we were approached by Gene Murrow," Fares says. "When we saw what the package was going to do, the type of system he was using, and the type of bidding procedures he was using, we thought it fit ideally into what we were already doing. Therefore, we didn't think we were going to have to spend too much time before we were going to be on line, and this turned out to be the case."

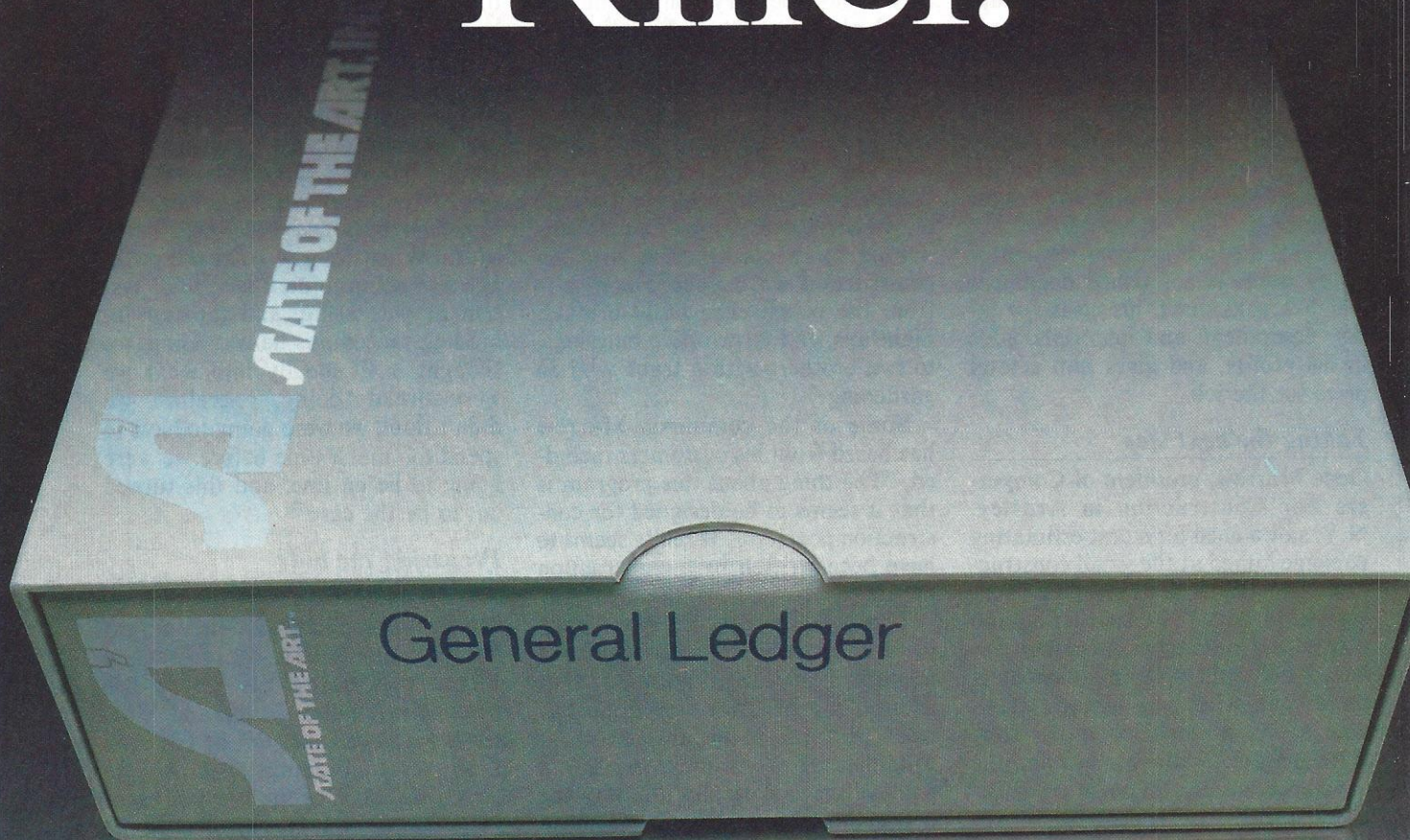
Preparing the bid

At the time of this writing Garrison Construction was developing a bid for a municipal sewer project and Fares was using his Televideo personal-computer system and Murrow's package to set up the bid. The first step in bidding, according to Fares, is to look at the types of excavations and the depths involved in the project. "Once you have a good picture of the job, you go out and take a look at it," he says.

Meanwhile, back at the office, Fares's secretary takes the specification sheet from the contractors and inputs all the item names, numbers, and material quantities into the computer. She then prints out a worksheet for the estimator to work with.

"The machine feeds out a worksheet with plenty of spaces left so you can fill in the type of crew, the type of equipment, the production they might be doing in certain areas, materials, subcontracts, and unit costs," Fares says. "Then the estimator, with the project plans and the worksheet, can go back and start to put some of these costs in, get quotes from material suppliers, etc."

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The problem with breaking down costs into subitems is that the client doesn't particularly want to know about them.

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All the information the estimator gathers in his preparations and fills in on the worksheet is then fed back into the computer.

According to Gene Murrow, there are four ways in which an estimator can work up a cost for a job: He can call up a price from a catalog; he can do a productivity estimate where he relies on daily cost figures to produce his bid; he can estimate the cost according to the unit prices given to him by suppliers; or he can rely on his experience and produce a "lump sum" type of estimate.

Murrow's system allows Ed Fares the option of cataloging all his jobs for recall. "Our system allows them to build up a history of how they bid on certain kinds of work items," Murrow says. "If they see another job coming down the line that looks a lot like an earlier job, they can just pull it from the catalog and they don't have to start over again."

The catalog is a great time-saving feature for the cost estimator. "If he knows his company has used a similar item before, he can call up the item out of the catalog and find out that in the past, for example, it cost him \$5.33 per foot to put in a certain kind of guardrail," says Murrow. "So for this job, which needs 137 feet of guardrail, the computer will automatically multiply 137 by \$5.33, and he's done estimating that particular price."

The productivity estimate is useful for new kinds of work too. "The estimator might say to himself, 'Well, to do this kind of work I need a certain kind of equipment—I need a loader, and I need a truck, and I know that the equipment is going to cost me \$1100 per day. I'm also going to need some people to run that equipment—I'm going to need laborers with shovels, and a guy to drive the truck, and another guy to operate the loader, and I know that's going to cost me \$1200 per day,'" Murrow says. "Then the computer will say, 'OK, I see what it's going to cost you per day

to do all this stuff, how many units of work can you do per day?' So the estimator puts in, 'With that crew and equipment, I think I could do 120 units per day.' The computer then computes what it's going to cost him to do the work and what it's going to cost him per unit."

The unit-price type of estimating involves a rule of thumb in the construction industry. Here, if a company is going to be putting in guardrails, the estimator knows his labor is going to cost him \$1 per foot, the materials are going to cost him \$1.80 per foot, and the equipment is going to cost him \$1.20 per foot. The estimator can then have the computer take these numbers and calculate the job.

Where do I stand?

At any point in the estimation process, the estimator can get a running total of his costs. "When he's halfway through the job for example, he can see that he has a total of \$183,000 in labor, plus \$127,000 in equipment, and \$100,000 in materials," says Murrow. "And he can go back and change and add items to his bid."

The estimator can also add subitems to his list. "Sometimes an item in a big document should be broken down into a lot of smaller items," he says. "For example, one item might be planting grass along the roadside. The estimator might want to break that down—first you have to grade the earth, and then you have to rake it, then you have to plant the grass, then you have to come back a week later to roll it and water it."

But the problem with breaking down costs into subitems is that the client doesn't particularly want to know about them. "If there are 10,000 feet of four inch pipe," says Ed Fares, "but there are six different digging conditions, you might want to break that item into six subitems. At the end, the owner doesn't want to see six subitems—he wants to see a price for 10,000 feet of four-inch pipe."

This system allows Fares to break down costs for his own costing purposes and then present a total cost to the contractor.

Playing the what-if game

At some point, the estimator has all of the items and subitems entered into his bid, and the computer has given him totals as specified by the bid document. He then prints out a total cost worksheet which runs down, item by item, costs for labor, equipment, materials, and subcontracts. Next comes the part of the bidding system which allows the estimator to assign general conditions costs and profits.

General conditions is a phrase used in the construction industry to describe all kinds of costs which are part of the job, but which are not specifically laid out in the specifications. These items include such things as insurance, field trailers, fuel, office costs, and portable toilets.

"The trick in the construction bid is to figure out how you are going to distribute your general condition dollars across the items in the original bid," says Murrow. "You can't add items to the contract. You can't say, 'By the way, I'm going to charge you \$5000 for the toilets.' They want to see what you are going to charge for each item."

To factor in these charges, the estimator uses the computer to distribute the costs of the general conditions across all or some of the items in the bid. Murrow's program gives the estimator three ways to massage the general condition dollars. "We allow them to assign a percentage markup for general conditions costs and overhead. We allow them to take a fixed amount of general conditions and overhead, and distribute them among the items on a pro-rated basis based on the total cost of each item. And third, we allow them to do selected items on an individual basis."

After the general condition dollars are distributed by the computer, the estimator can print out a trial bid.

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According to Ed Fares, “We might then want to go back and say, ‘Well, we really don’t want to do it that way because the general conditions are all going to be extended in the beginning of the job, such as setting up the trailer. Maybe we don’t want to put the general conditions on items that won’t help us a year down the road.’ So we can go back and allocate certain amounts to each item for general conditions. We keep massaging until we get a bid with the kind of numbers we want to see.”

You’ve got to make a profit

Murrow’s program also allows the same kinds of massaging procedures to take place to calculate the company’s profit on a job. “Somewhere they have to make a profit. Up to this point all they’ve had is what their costs and general conditions are,” he says. “You figure you can afford to make a certain amount of money on the job without making your estimate too high. Obviously, if you get greedy and give yourself a lot of profit, you’re not going to be the low bidder on the job. And that’s the name of the game—being the low bidder. So we allow them similar games to be played with profits.”

The estimator can also keep separate totals for labor, equipment, and materials. Whenever the final bid is printed out, these three categories are broken down in the report. “That’s important to a construction company because sometimes they like to know how much of the cost is in equipment, how much of the cost is in labor, and how much of the cost is in materials,” he says.

The last part of the program allows the estimator to play the what-if game and massage the final numbers in his job estimate. “When all is said and done, you’ve estimated the actual costs, given the costing part of the program. Then, add in your general conditions and overhead, and you’ve added in the profit and played all the games. The computer then has a

price for each item—the cost, plus the overhead, plus the profit. Well, sometimes these guys don’t like the final prices—they want to round it off to the nearest five cents or the nearest dollar and the final part of the program allows them to do this.”

“In the end,” says Ed Fares, “if someone calls up and changes their materials prices by any significant amount, we can incorporate that by just pulling up the items in the system and remassaging the original costs and leaving the general conditions, overhead, and profit the way they are. Or, if we get numbers that we normally don’t like to bid, like \$12.21, we can round those numbers off again.”

As Gene Murrow tells his customers, “A package like this doesn’t replace an estimator, but it makes an estimator a lot more productive. The same guy, or the same team, we’ve found, can turn out three times as many competitive and accurate bids than they could without a computer.”

“The computer doesn’t know how long it takes to put feed into the ground or put up a steel superstructure on a suspension bridge. But the guy who does know that kind of information gets through the process three times faster using the computer.”

Ed Fares subscribes to Murrow’s view—the computer and the cost-estimating software have not replaced the estimator in his business. “We still go through every job very carefully and take quantities off the bid sheet. Then we print out a worksheet from the computer, and the estimator writes in the material requirements, and that gets punched back into the computer,” he says.

“And because of the way it can report out a form, we can quickly change last-minute material prices and scatter them through the bid,” Fares continues. “We can quickly change crew or equipment costs if we think the job might require a different crew or a different type of equipment.

“The computer has also allowed us to bid more jobs without having to worry whether we’ve made the kinds of mistakes you normally anticipate when you are just plugging away with a calculator,” Fares says. “We are not constantly proofreading and checking for mathematical errors.”

But Fares hasn’t stopped there. He recently used dBASE II to set up records for equipment maintenance and vendor lists. “We have particular items that might have to be searched out with a phone book or by skimming through old job records to find out who makes a certain kind of pump,” he says. “I’m trying to incorporate that information into a filing system, so we can call up the particular kind of item and locate the various vendors who might supply it, and save some more time in bidding.”

Had it all in his head

Judy Hendrickson, vice president of Banfill Plastering in Clayton, Ohio had a special cost-estimating problem. Like most others who get involved in computerized cost estimating, she wanted to save time and increase the accuracy of her bids since she does all of the cost estimating for her family-run business. But Hendrickson had the additional problem of getting all the information into one place.

“My father has been in the plastering business for about 40 years and he has all of this information in his head,” she says. “What I wanted to do was get the information into a computer, so if he’s not available I can still price things out accurately.”

To solve her problem, Hendrickson purchased Safety Net, a computerized cost-estimating package that runs on the NorthStar Advantage, from Carter Information Systems in Hudson, N.H. “We talked to a lot of people who said, ‘Oh, yeah, we can give you an estimating program,’ and all it is is a fancy calculator,” she says. “You still have to figure everything out yourself.”

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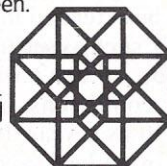
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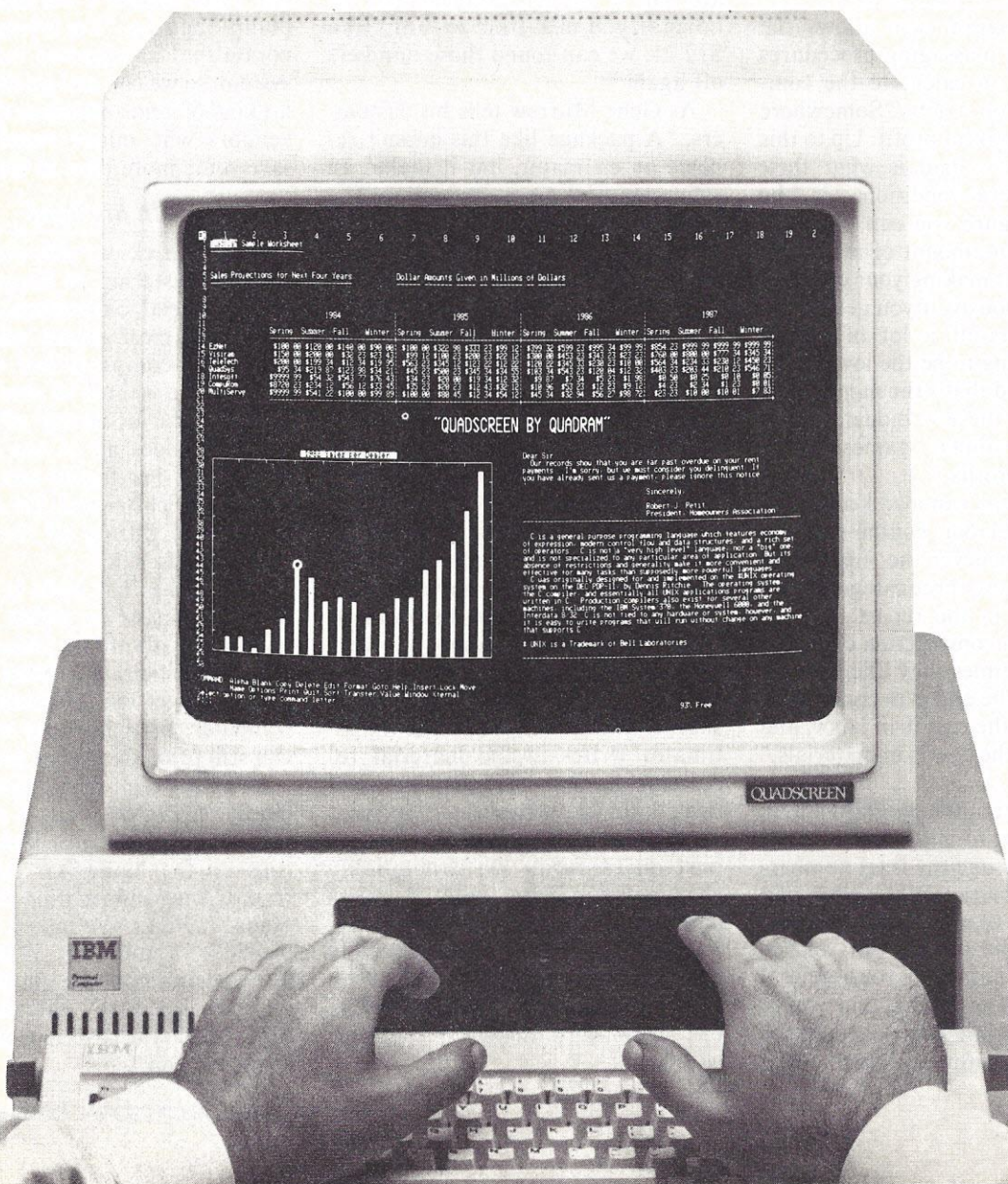
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BUSINESS

"My father has done estimating for so long by feel—what he feels is right—and the Carter system is based on production rates and materials costs. So, we are taking the two and meshing them to get a price list that we want. It's really working out very well."

According to Robert E. Mushow, vice president of sales and marketing for Carter Information Systems, "With our computerized estimating systems, jobs can be broken down into as many as 1000 individual units which can further be separated into as many as 1000 building areas or levels. You can estimate a job at one set of worker pay rates and production rates, and then change these values. The computer will refigure the estimate based on these new values."

Safety Net includes a file of most standard-specification building systems, much like Gene Murrow's catalog function. The estimator can select the jobs, or systems, as Carter refers to them, to meet his needs. He can also design systems unique to each project's particular building needs and enter them into the computer's memory.

Also stored in the computer's memory are the production rates, material quantities, and unit prices for each of the system's components or items. The estimator can override these standard values if he decides they should be changed; for example, if constructing a particular system is more complex or difficult than normal.

"Increasing an estimator's productive time and bid accuracy is of great importance to the contractor," says Mushow. With Safety Net, "the estimator isn't tied to the computer. Data entry can be performed by an office worker. The computer actually becomes an extension of the estimator, freeing him from the tedious time-consuming work usually associated with manual estimating."

In order to have an accurate com-

puterized estimating system, Mushow says, it is necessary to start with an accurate manual estimating system, which must guide the creation of the program.

Once the program is loaded, the estimator calls up the main menu and starts with the first item—entering all the pertinent data for the job. These data include the job description, owner name, job title, building description, location, etc. Then, as in a manual cost estimating system, the estimator reviews all the building plans and determines the various systems required to complete the project.

All the data concerning the different items that go into a job—the specifications—are entered on a worksheet, much like Gene Murrow's program. Once the systems have been entered into the computer, the operator calls for a system detail report to be printed. Each system will be priced out for labor and material costs, as well as man-days required.

The next step in Safety Net is called a take-off. This consists of the estimator going over the plans, taking off the quantities of each type of system used, and listing them on a worksheet. The estimator then enters this information into the computer and prints out a take-off report to check for accuracy.

Once the take-off sheet has been verified, the estimator prints out the bid-price sheet. The computer program automatically extends each system quantity by the costs for that system. The estimator can also take into consideration other items which might affect the total bid price, for example, loading and distribution costs, foremen's wages, materials price increases, and cleanup costs.

The finished bid-price sheet details each system used and calculates a price for each. Then the task of estimating the project is complete.

"All the labor involved that makes cost estimating such a cumbersome task has been completed by comput-


er," says Mushow. "If the estimator wants a detailed material list, it can be printed any time after the take-off quantities have been entered. Materials required for each system can be printed right down to the smallest details, such as the number of screws and nails required."

The materials list is one of the advantages Judy Hendrickson appreciates in Safety Net. "After you put in your basic job information, you have to put in what the wall system is made of," she says. "This system goes from one side of the wall to the other—the board needed, the studs, if the customer is getting insulation, if he is getting extra trim, etc. When the package totals up the system in the end, you know exactly how much material you need to do that wall."

The package also gives Hendrickson the ability to break projects up. "An awful lot of the time you'll have a job situation where they'll say, 'OK, your price included items one through 10 and this other contractor only included one through six. Can you pull out those last four items so we can compare them favorably—one with the other—like apples to apples?' And the computer makes this a whole lot easier."

After the job bid is done, however, Hendrickson still looks it over to get a feeling of whether or not the price is right. "You still have to have a feeling of whether or not the prices make sense," she says.

And most of the time they do. Computerized cost estimating has proved to be, for both Judy Hendrickson and Ed Fares, a solution to their bidding problems. And their computers have each become a welcome alternative to the pencil, paper, and calculator that they used to use.

Carter Information Systems sums up the problem this way: "Cost estimating is a lot like walking a tightrope. One false step, and your business takes a nosedive. If your estimate is too high, you lose the job. Too low, you lose your shirt." 

Business Decision.

Let's be honest.

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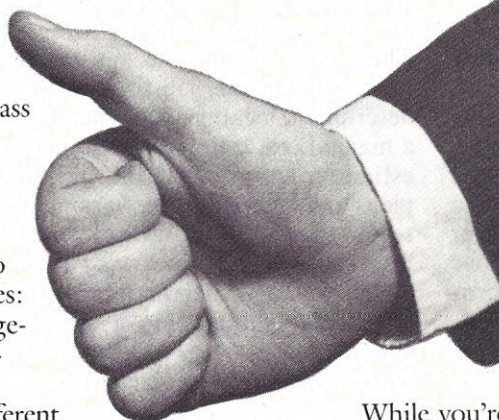
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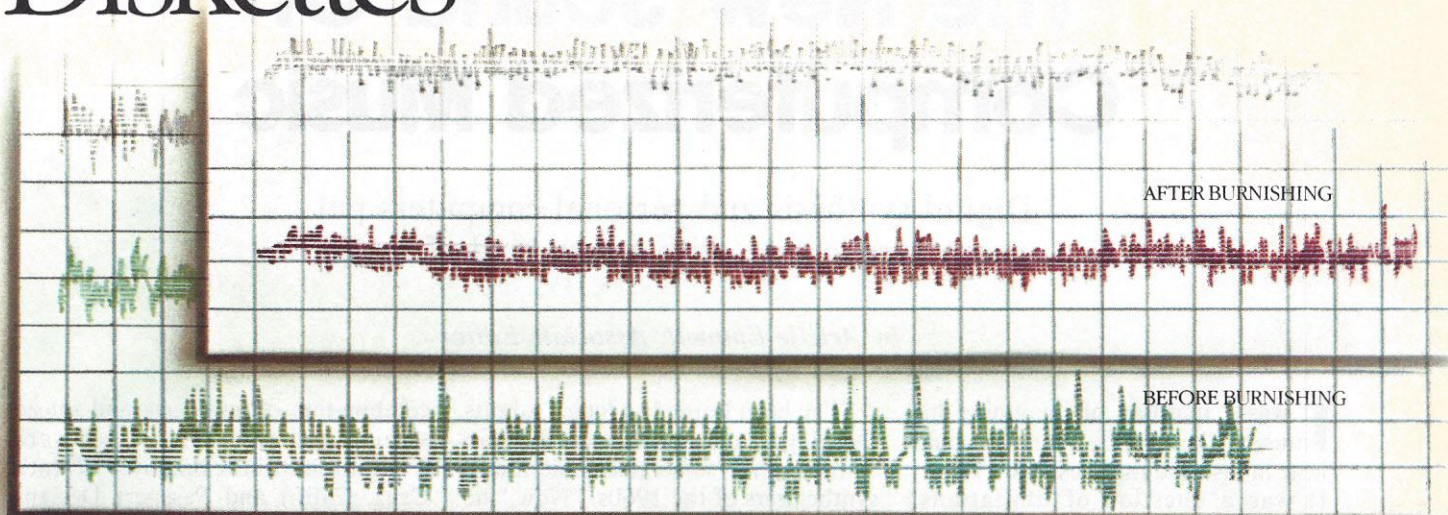
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TWO

Second in a Series

Burnishing

The New Sound Of Computerized Music

Digital synthesis and personal computers put composers in tune with a new kind of music

by Arielle Emmett, Associate Editor

It was a question of imagining his music: There were notes he could hear in his head that he couldn't play. It was a question of limitations: There were melodic lines he could hear in his head but couldn't play. There was the matter of sound being the product of the physical composition of instruments. So many instruments could produce so many wave forms, and no more.

For Bruce Hutcheon of Bayshore, L.I., a serious home musician and computer buff, the question ground down finally to need, and fulfilling that need, and it had bothered him in one way or another since his music study days at New College, Sarasota, Fla. (now part of the University of South Florida), where he had written string quartets and polyphonic exercises, several of which he had never heard played. He needed to find the right technology to help him compose, shape, and perform complicated works of music that were beyond his own technical capabilities as a performer. And he wanted to shape sounds with absolute mathematical precision—in his words, “to build (instrumental) voices” that had no counterpart in nature, or at least in the traditional lexicon of orchestral sound.

Hutcheon found the right technology, finally, through his own personal computer, an Apple II Plus, and a music synthesizer system.

“I’ve been limited so long,” admits the 31-year-old Hutcheon, a veteran of the cumbersome electronic music synthesizers of the 1960s. “Now,” he says, “I really enjoy building sounds. When you start out on an older synthesizer and move over to a computer, it’s very easy to create instrumental voices.”

Hutcheon isn’t unique. He’s one of thousands of musicians throughout the country—from elementary school kids experimenting with their first electronic keyboards, to composers as advanced as he, even professional musicians—who are taking advantage of new and increasingly affordable hardware and software music systems that have filtered down from state-of-the-art digital technology. Digital synthesis is the means by which a computer can make and store a mathematical representation of a sound wave, and then reproduce it again as an audio signal. These systems, many of them ready to plug in and play, vary widely in sophistication, fidelity of sound, and price. But virtually all the systems make it possible for a home musician to wed a personal computer to keyboards, software, and, in the better systems, digital oscillator boards, and to make music.

“You can create up to 16 instrumental voices, so it’s a symphonic effect plugged into your stereo,” Hutcheon says of his own system, a

combination of hardware and music scoring and performance software from Mountain Computer (Santa Cruz, Calif.) and Passport Designs (Half Moon Bay, Calif.), two of the leaders in the field. (See sidebar, page 76.) In addition to creating different instruments with the synthesizer, a musician can also “dissect” the shape, tone, and color of a musical note. This is done by manipulating mathematical values of the note—its pitch, duration, frequency, rate at which it is sustained or decays, numbers, and types of overtones, etc.—or by drawing its wave form with computer graphics, in which the musician actually “sees” the sound he is about to play.

Controlling the sound

“The essential issue is you have control over the sound,” declares Hutcheon’s friend and fellow-musician Rod Kohler, who by day shares business responsibilities with him in the telecommunications and computerized business accounting company they run, Synergistic Communications, Inc. “The music system not only provides complete flexibility in controlling the wave form,” he says with the sober precision of the music aficionado, “but it can also offer immediate feedback, do the work of many performers,” teach basics, and record in up to 16 tracks—a capability surpassed only by professional music

When you move from an older synthesizer to a computer, it's easy to create instrumental voices.



Photo by George B. Fry II



Photos by Werner Wolff/Block Star

Hutcheon and Kohler (right) begin to define an instrumental voice by manipulating a wave form on the screen. As Kohler plays, Hutcheon enters different numerical values on his Apple II Plus which determine the unique sound qualities of the note.

studios. What's more, a good home synthesizer can play back recorded music "literally thousands of times without distortion," Kohler says—and that is the essence and "beauty" of digital technology.

"The main difference is how the music is produced and stored," Kohler continues. Old-fashioned recording and synthesizing devices, such as the famous Moog synthesizer of the 60s and early 70s, were based on the idea of analog storage—that is, an audio signal was produced and stored in such a way that the physical pattern of its wave form was actually "captured" in a medium (such as the grooves of a record or magnetic tape). "The original Moog synthesizers were actually analog computers,"

Hutcheon adds. Instead of dealing in numbers, they dealt in continuous functions which produced a wave. This, in turn, was converted through an electronic circuit into a signal, and then amplified.

Cutting out distortion

But gradually, Hutcheon continues, there was a progression from the old synthesizers—the kinds he and Kohler used in college to compose music—to various devices that represented "primitive forms" of digital control. These included paper tape devices with holes punched in them, much like teletype machine code and the keyboards themselves. The actual sound-producing circuits were still analog types—they produced sounds

by control voltages going up and down—and the early synthesizers also contained complex "sequencers"—a bank of horizontal and vertical knobs controlling the pitch, volume, and other parameters of the note. Sound filters and patching cables were also required. In all, a complex, expensive, and time-consuming system whose sound, if recorded, would deteriorate over time, in the same way as records and tape deteriorate because the analog "tracks" wear out.

"But in digital synthesis and recording," Kohler enthuses, "all that's stored is a series of numerical values which can be used to create an analog of the wave form," i.e., the actual audio signal. This, in essence,

*Instead of dealing in numbers
they dealt in continuous
functions which produced a wave.*

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WHAT TO DO IF YOU WANT TO BUY

An important thing to remember in assessing your needs for a home music system linked to your personal computer is that there are as many varying levels of sophistication as there are types of musicians. On the most basic level, some personal computers, such as the Apple, are equipped with small speakers, or "beepers," which do not contain an actual synthesizer, but can produce rudimentary pitches when wed with the right software. On a slightly more advanced level are computers with various types of sound-producing chips built in—such as the digital chip for the Atari 400, 800, and the 1200 XL, which can produce four voices in a three and one-half octave range; and the analog-type synthesizing chip for the Commodore 64, which can produce up to 10 different musical instruments, three played simultaneously. These systems are controlled through software and the computer's keyboard; both Commodore and Atari feature add-on cartridges, allowing the musician to write music and learn music fundamentals.

To create a more sophisticated system, an operator can add to some computers a digital-to-analog converter board (DAC). Pure software music synthesis programs, such as Instrument Synthesis Music from Micro Technology, can run on computers with the DAC. Other systems are self-contained, such as Compu-Music from Roland Corporation (Los Angeles, Calif.), which features a six-voice music synthesizer that interfaces with many different personal computers. The Music Card from ALF Inc., offers a three- or nine-voice synthesizer board, a sophisticated music editor, and software which runs on Apple IIs and Apple II-compatibles only.

"It allows the students to write something, use the music editor, and play it right back," he says. He uses the system in conjunction with 42 Apple IIs to tailor his instruction to each student's individual level of musical training. This is facilitated by ver-

satile software programs such as Apple Music Theory, available through the Minnesota Educational Computing Consortium (St. Paul, Minn.), which actually features 16 different graduated programs teaching key signatures, note types, counting, rhythm, scales, harmonics, and more complex subjects, as well as drill-and-practice sections. (Music Theory has also been configured to run on the Atari 400 and 800.) *The New York Times* recently called it "a real find for serious music students." By extension, Music Theory may also work well on the personal computer at home.

For more advanced musical capability, though, a home user may consider graduating to full-scale digital systems, including the electronic keyboard. Soundchaser, in conjunction with Mountain Computer's MusicSystem, is an example. Its standard four-octave keyboard, plus interface card, four-track polyphonic sequencer, and the Mountain MusicSystem retails for \$1190. An additional software package called Turbotraks can boost Soundchaser's recording capability to up to 16 tracks. The more expensive, and well-reviewed, alphaSyntauri Synthesizer System from Syntauri Corp. (Palo Alto, Calif.) is a high-end consumer musical product that has many professional features, according to Syntauri's president Ellen Lapham. One of them is Syntauri's five-octave velocity-sensitive keyboard, which responds to a player's particular touch—i.e., it acts somewhat like a piano keyboard, and by the same token, offers the instrumental capabilities of the organ. Thus the keyboard can be electronically "divided" into different instrumental voices. In addition, Syntauri offers METATRAK II, featuring 16 separate polyphonic tracks of recording capability. The full five-octave keyboard system costs \$1995 (\$1795 for a four-octave keyboard system). Both ear-training (called MusicMaster, \$295) and a scoring system (Composer's Assistant, \$395) are available.

is the synthesizer's precise mathematical rendering of every sound stored and played. Since there is no "track" or groove to wear out, the reproduction of the sound remains virtually distortion-free over thousands of playings.

Today, home digital synthesizers form a subset of a broader range of music systems owned by roughly 5 percent of all home-computer users, according to industry analysts; some of these systems still use analog oscillators to produce their sounds. (Examples include the three-voice analog synthesizer chip built into the Commodore 64.) In the very advanced digital systems, though, software—in conjunction with the computer and the digital oscillator board producing the audio signal—analyzes sound by literally "slicing up" a wave form—taking samples of it at a constant numerical rate; the more samples, the more precise the mathematical "representation" of the wave form. Once this representation—known as a cycle definition—is established, the computer can then play back the numbers at the same rate, producing an exact "copy" of the sound.

According to Chris Albano, vice president of marketing for Passport Designs Inc., the current intermediate-line home digital systems, such as Soundchaser and alphaSyntauri from Syntauri Corp. (Palo Alto, Calif.), do not feature sampling capability. Instead, current systems use "wave form approximation" in which, he says, "we copy a violin (numerically) and stick it into the software." Albano predicts sampling capability will be available in home synthesizers in the not too distant future.

While the industry is moving in that direction, says Ellen Lapham, president of Syntauri Corporation, she also cautions that this feature would be costly and suited only to consumers demanding professional sound-analysis standards. "What we give the user in lieu of expensive sam-

Composers using synthesizers are creating new and challenging forms of music.

pling hardware is a lot of software to create his own sounds," Lapham explains.

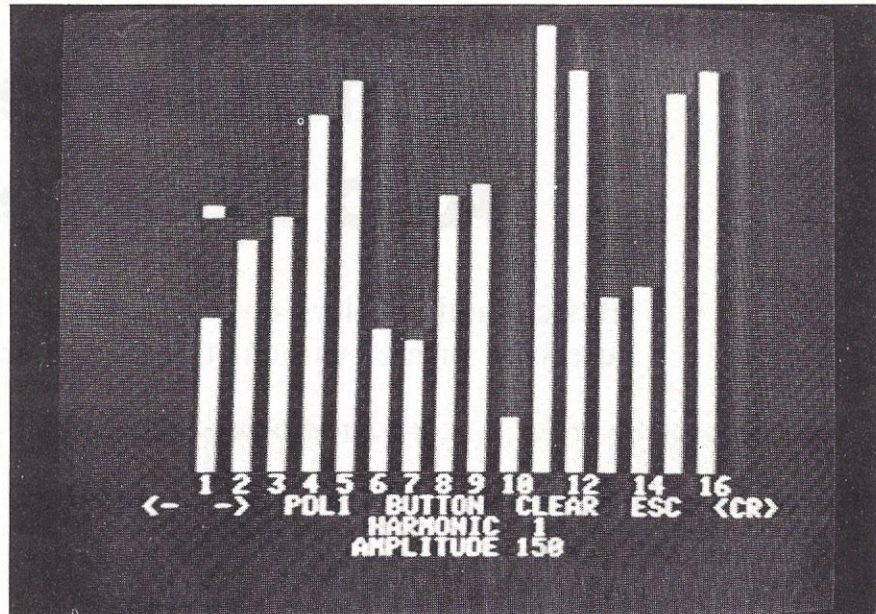
Since the systems are digital, the composer can manipulate the sounds by manipulating numbers, adds Kohler; it gives a composer the leverage to increase the volume or alter any other mathematical value that shapes the note, so that you can literally "break out of the limitations of the physical universe," he says.

Seeing notes as shapes

In real terms, this translates into note "shapes" which have never been heard before from conventional orchestral instruments. In Hutcheon's and Kohler's experience, these "shapes" suggest strange musical qualities, some of them tinny, some frankly honky-tonk, ragtime, avant-classical, harpsichord-like or oompah-pah, some defying labels. There is also the "schmaltz" element, Hutcheon concedes. Though he is a staunch admirer of Bartok's impressionistic techniques—the "greatly extended harmonies" and string quartets that "crawl over themselves getting to places you'd never expect," he says, Hutcheon still spends long hours "perfecting the cello voice" on the synthesizer because of its romantic, even "sloppy" qualities that lend themselves to such long compositions as "Carlaluna," which, he says, is "named after a fictitious woman."

Kohler, by contrast, seems to defend the more non-conventional acts of the music. "I wouldn't say the experience was intentionally recreating the past," he says, referring to his own work, "The March of the Mixed Vegetables," a selection *Personal Computing* listened to on Hutcheon's system (it was recorded and played back). "I conceived it as a multimedia event . . . Ideally, there would be vegetables walking down the street," as the music played, "but failing that, a film would be it," Kohler says.

Unfortunately, the film was never



Defining an instrumental voice by manipulating the intensity of the overtones on a bar graph is part of the Soundchaser software Kohler and Hutcheon use.

made. But listening to the composition did confirm that Kohler had achieved quite a "squishy" quality in the music; it had a feel of parade, ragtime, sluggish vegetable matter, and tubas, all rolled into one. To be fair, it was comic and subtle, but the sound quality, especially in the percussive sections, was surprisingly weak. And the tempo seemed to drag—deliberately or not. Kohler admitted that percussive sections, including the so-called "piano" voice of most current home synthesizers, are weak—possibly because the synthesizers do not have the capability to exactly create noisy or irregular wave forms. But he believes that will change over time. Also, he says, "Synthesized music has an artificial quality to it—it's hard to overcome . . . It's difficult to simulate the sounds of a physical instrument."

New forms of music

"But my response to that dilemma," he continues, "is, 'Why bother?' That's one of the mechanisms of creating new things . . . Who cares if it doesn't sound like an orchestra?" The

fact remains that composers using synthesizers are creating new and challenging forms of music, he says.

So how, exactly, do they do it? What does it mean to shape a note, much less a musical voice? According to Hutcheon and Kohler, tones are defined not only by their pitch and duration (we know pitch because it's defined by notes on a scale, such as A flat, C sharp, etc.; duration is how long a note is held), but also by the wave form—its size and shape. A clarinet's high reedy sound, for example, looks a lot like a square wave when seen on a CRT; a cello resembles a saw-toothed wave with plenty of jagged spots, and these are known as "overtones," or harmonics, which give each musical voice its unique sound character.

In addition, there is something called the sound "envelope," which is also a measure of how a note sounds as it is played on a particular instrument. It consists of four major values which can be manipulated numerically on the Apple board and then "fed" as hexadecimal information in-

(continued on page 166)

Printer Buffers And Spoolers

Buffers and spoolers save you time by letting you use your printer without tying up your computer

by David Gabel, Senior Editor

Isn't there some way you can continue to use your computer while you're printing a job? Yes, there is. You can install a printer buffer or spooler, additional hardware or software that keeps the data you're printing in a separate memory, freeing up your computer's memory for other things.

If there can be an age-old problem in a field as new as computing, this is it: Computers are slowed down by the electromechanical devices they must use to communicate with the people they are supposed to serve.

The problem has been around since the beginning: Make the computer do two things at once. Make it access its peripherals at the same time it's doing something else. It's a good idea, of course, but it doesn't quite work that way. A computer can only carry out one instruction at a time. If it's told to print, it prints, and then waits for the next instruction.

Amazing grace

The salvation is in the fact that the print instruction, or data-fetch instruction, or move instruction, typically takes microseconds, or millionths of a second. By comparison, people take a long time deciding what to tell the computer to do. So while the people are thinking, a program can tell the computer to do something, until the slow operators make up their minds. Early on,

software-system designers developed programs to do this. They split the memory of large computers into small chunks, typically called partitions, and put one program into each partition. Then operators could run a large program, a personnel system, say, in the large partition, and a small program, like printing, in the smaller partition. In a two-partition system, the larger partition was called foreground, and the smaller, background. Common background tasks were "writes to" and "reads from" a slow, electromechanical device like a tape drive or a printer. When the computer got to a point in its large program—like waiting for the operator to input a date or time—where it had nothing to do, the background program would interrupt the main task and tell the processor to do some printing. Then, when the main task received the message it was waiting for, it would interrupt the background task and tell the computer it was ready to proceed with execution.

The process of I/O handling in background came to be called "spooling". This term is an acronym for "simultaneous peripheral operations on line."

Until fairly recently this process was only used on mainframe computers. Spooling takes memory, and memory used to be expensive. Nowadays, memory is fairly cheap,

so software that performs the spooling process is becoming available.

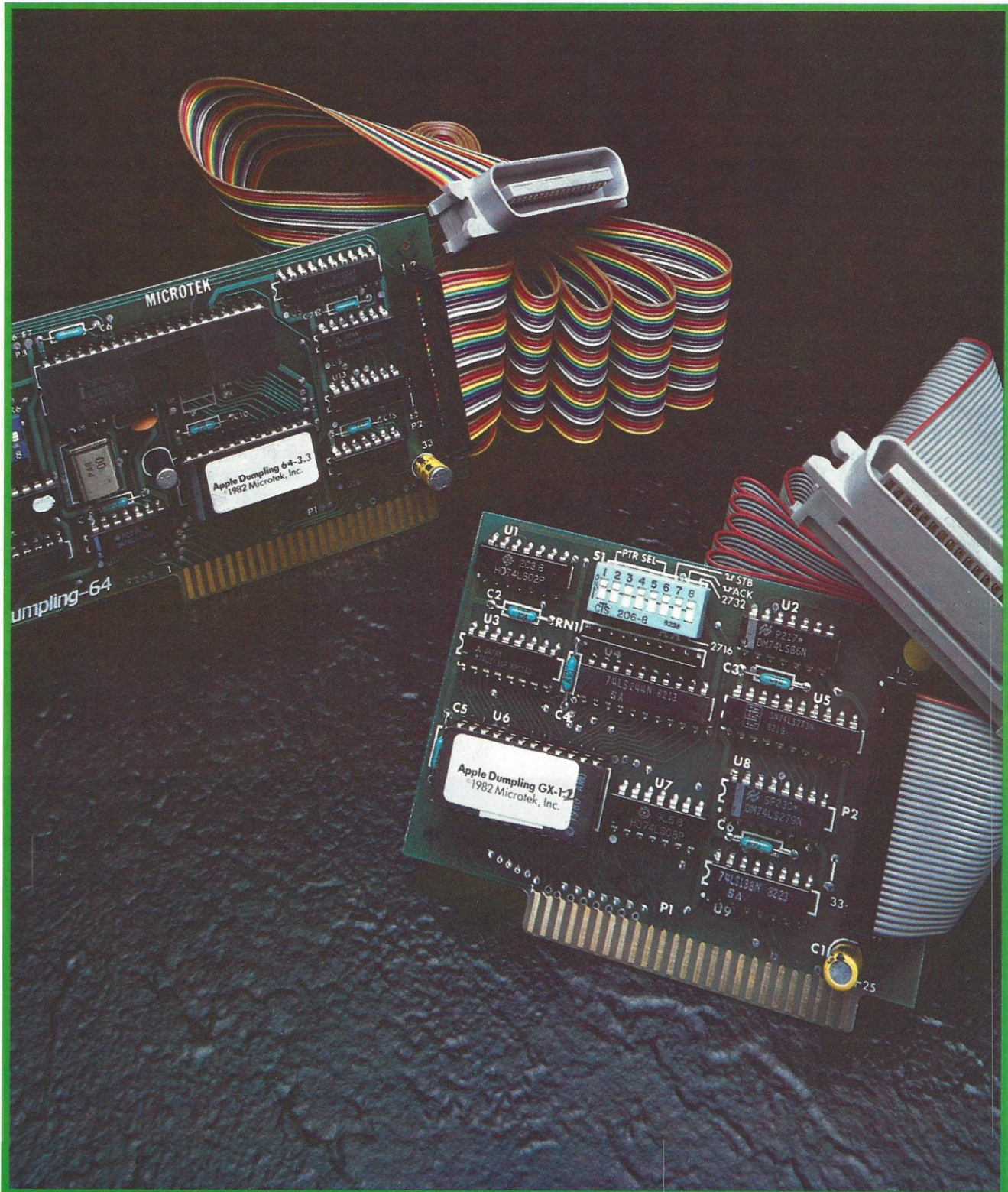
As memory prices have dropped, so has the cost of microprocessors, the chips which function as the brains of personal computers. With lower microprocessor prices came the development of a class of peripheral called a printer buffer. A printer buffer usually has its own memory—the buffer part—and its own microprocessor, which implements a spooling function. So buffers for personal computers provide, in effect, a separate computer devoted to one function: controlling a print task as a slave processor to the central microprocessor inside the computer case. You can also think of it as providing a separate partition of memory accessed by its own microprocessor to control the print task.

Available printer helpers

Buffers and spoolers perform the same function: They allow the printer to print without monopolizing the computer, so the user doesn't have to wait for the printer to stop before using the computer for other things. For our purposes, we'll call any hardware device that performs this task a buffer, and any program that does it, a spooler. People in the industry use

RIGHT: The Dumpling-64 graphics printer spooler and the Dumpling-GX graphics printer interface (Microtek Inc., San Diego, Calif.) for Apple computers.

Having a computer handle I/O through a separate portion of main memory came to be called "spooling."



the terms interchangeably, though, so don't be surprised if someone you talk to objects to our definitions.

Buffers range from the simple to the sophisticated. They can be as basic as an 8k buffer with a single input and a single output, both input and output being the same kind of interface. Or, they can be complex enough to connect as many as eight computers to several printers or other devices. Costs will vary, of course, with the sophistication of the device you have in mind.

Single-input-single-output devices include such buffers as the Microfazer from Quadram Electronics of Norcross, Ga. This unit is available with 8k to 512k of buffer memory. The company says the 512k memory is equivalent to the largest memory that works on the IBM Personal Computer, and can store over 250 normal typewritten pages.

The Microfazer and other buffers of this type are available with a number of input/output combinations—serial in/out, parallel in/out, serial in/parallel out, and parallel in/serial out. The combination you choose will depend on your computer and your printer.

If your computer is equipped with a parallel output port for a printer,

for example, and you happen to have a serial printer, like a daisywheel or a NEC Spinwriter, then you would choose a parallel in/serial out port combination.

If you need a serial interface, you should be aware of a potential pitfall. While the EIA (Electronic Industries Association) RS-232-C interface is the standard serial interconnect scheme, it leaves a lot to be desired. Different manufacturers implement the standard in their equipment in different ways. Your buffer should be able to support the interconnect requirements of your printer, including protocol, word size, parity bit arrangement, and hardware handshaking. Most of the buffers we're familiar with do all these things, but make sure you find out before you buy.

Thanks for the memory

Some companies make buffers for specific computers. Practical Peripherals of Westlake Village, Calif., for example, makes the Microbuffer II for the Apple II and the Microbuffer/E for Epson printers. Special-purpose buffers like these will ease the compatibility problems mentioned earlier.

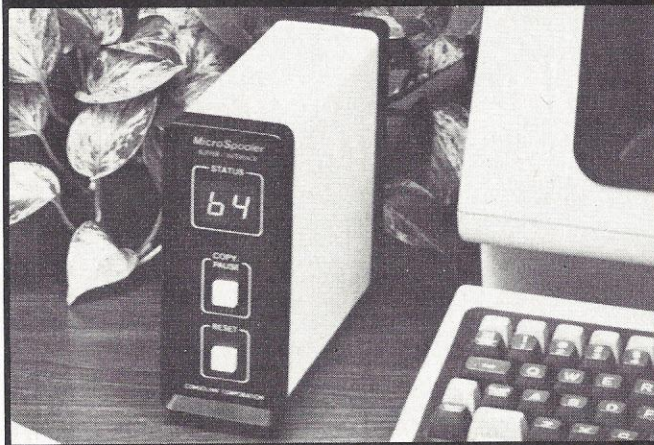
You might think at this point that

you'll never need 512k of buffer memory. You could be right, but then again, you never know. I used to think I wouldn't need that much memory, but one day I had to print out several copies of a 20-page manuscript. My 32k Microfazer filled up before all the text had been sent. Printing that job took a long time. Obviously it didn't take as long as it would have if I hadn't used the buffer at all, but it would have been faster with a larger buffer.

You may not have a 20-page manuscript to tackle, but what about multiple copies of a resume, or a form letter asking for information from a number of computer manufacturers? In this kind of situation, the more buffer memory you have, the faster your print job will be completed.

While we're on the subject of simple printer buffers, I should point out a small problem I had with the Microfazer on my Epson MX-80. The model I have plugs directly into the Centronics parallel port on the back of the printer. The instruction book tells you how to attach the buffer, and provides a step-by-step procedure, involving some soldering, to bring power from the printer to the buffer. The alternative to this procedure is to use a transformer that

Micro Spooler (Consolink Corporation, Longmont, Colo.) is a 16k spooler (expandable to 64k) for use with any combination of parallel or serial data.



Printer Optimizer (Applied Creative Technology Inc.) is a 64k buffer (expandable to 256k) that can be used with all printers to mix unmatched serial and parallel interfaces.



*A buffer can be
a simple device with
one input and one output.*

A BUYER'S GUIDE TO BUFFERS AND SPOOLERS

BUFFERS

APPLIED CREATIVE TECHNOLOGY
INC.

2723 Avenue E. East, Suite 717
Arlington, TX 76011
(800) 433-5373; (817) 261-6905
Printer Optimizer/64k-256k
Use with all printers as an
adapter to mix unmatched
serial and parallel interfaces.
\$545-\$1080
CIRCLE 250

DATA-MATCH CORPORATION
3810 Oakcliff Industrial Ct.
Doraville, GA 30340
(404) 441-0408
Smartbuffer/16k-256k, user
upgradable
For all peripherals and
computers using RS-232 serial
interface or Epson Centronics
parallel interface.
\$335-\$1875
CIRCLE 251

DIGITAL GRAPHIC SYSTEMS INC.
935 Industrial Ave.
Palo Alto, CA 94303
(415) 856-2500
CAT Series/32k-768k
With S-100 or as independent
peripheral.
\$2000 up
CIRCLE 252

INTERACTIVE STRUCTURES INC.
146 Montgomery Ave.
P.O. Box 404
Bala Cynwyd, PA 19004
(215) 667-1713
IS Pipeline Random Access
Printing Buffer/8k-128k
With any parallel Centronics
interface.
\$230-\$440
CIRCLE 253

MICROTEK INC.
9514 Chesapeake Dr.
San Diego, CA 92123
(619) 569-0900
Dumping Series/16k-64k hard;
200k using compression
Apples and Apple look-alikes
\$159-\$399
Tele-Buffer Series/64k-256k
All personal computers
\$299 up
Standalones/64k-256k
All personal computers with
parallel and serial ports.
\$199 up
CIRCLE 254

ORANGE MICRO INC.
1400 N. Lakeview
Anaheim, CA 92807
(714) 779-2772
The Bufferboard/64k

Apple II, II Plus, IIe, III with user's
interface card and cable
\$175 (16k); \$203 (32k); \$259
(64k)
The Buffered Grappler Plus (card
with built-in buffer)
Apple II, II Plus, IIe, III
\$239 (16k); \$267 (32k); \$323
(64k)
CIRCLE 255

PRACTICAL PERIPHERALS
31245 La Baya Dr.
Westlake Village, CA 91362
(213) 991-8200
Microbuffer II/16k-32k
Apple II, II Plus, IIe; Franklin; others
\$259-\$299
Microbuffer/E/8k-64k
Epson printers
\$159-\$279
Microbuffer Inline/32k-64k (up to
256k with expansion modules)
Centronics or
RS-232-compatible
\$299-\$349; 64k memory
modules/\$179
CIRCLE 256

PROMETHEUS PRODUCTS
45277 Fremont Blvd.
Fremont, CA 94538
(415) 490-2370
P/S Buffer Card/16k-64k
(parallel and serial)
Apple II, II Plus, IIe; Franklin
\$125-\$199
P/S Buffer Box/16k-128k
(computer-independent
external box)
Use with RS-232 or
Centronics-compatible
computers.
\$249-\$499
CIRCLE 257

QUADRAM CORPORATION
4357 Park Dr.
Norcross, GA 30093
(404) 923-6666
Microfazer Printer Enhancer/
8k-512k
Epson printers
\$159-\$1395 (parallel to parallel
models, including cable);
\$199-\$330 (8k-64k, serial to
parallel and parallel to serial
models)
Interfazer/16k-64k
IBM Personal Computer with
RS-232-C or parallel I/O cards
\$295 base unit; \$195-\$295 RAM
cards
CIRCLE 258

WARN ELECTRONICS LTD.
P.O. Box 526
315 Park Ave.
Knightdale, NC 27545

(919) 266-9411
Warn PI-II/16k-60k
Use with all 12-bit daisywheel
printers.
\$525-\$650 assembled;
\$200-\$225 bare board operating
PROM
CIRCLE 259

WESPER MICRO SYSTEMS
3188A Pullman St.
Costa Mesa, CA 92626
(800) 854-8737; (714) 850-1666
Wizard BPO9 (Buffered Parallel
Output)/16k-32k
Apple II, II Plus, IIe
\$179-\$219
Wizard SOB (Serial Output
Buffered)/16k-32k
Apple II, II Plus, IIe
\$239-\$289
Wizard EBI (Epson Buffered
Interface)/8k-64k
Epson printers
\$139-\$280
Wizard EBS (Epson Buffered
Serial)/8k-64k
Epson printers
\$196-\$336
Wizard BPO III/8k-64k
Apple III
\$240-\$381
Wizard Serial/Parallel Buffered
Printer Card/16k-64k
IBM Personal Computer
\$349-\$499
CIRCLE 260

SPOOLERS

CONSOLINK CORPORATION
1840 Industrial Circle
Longmont, CO 80501
(303) 651-2014
SoooperSpooler/16k (parallel to
parallel)
Use with RS-232 or
Centronics-compatible
computers.
\$349; \$95 for serial card
upgrade; \$159 for memory
expansion to 46k
CIRCLE 261

DIGITAL RESEARCH
P.O. BOX 579
Pacific Grove, CA 93950
(408) 649-3896
Spooler is a standard feature in
MP/M operating system.
\$450 for operating system
CIRCLE 262

MICROTEK INC.
9514 Chesapeake Dr.
San Diego, CA 92123
(619) 569-0900; (800) 854-1081
Master Spooler I and II
Converts IBM Personal Computer
RAM into partitioned memory
segments in 1k blocks.

Boots into DOS on all IBMs
through DOS 1.1.
\$99.95
CIRCLE 263

PHASE ONE SYSTEMS INC.
7700 Edgewater Dr.
Oakland, CA 94621
(415) 562-8085
Built into Oasis 8 computer
operating system.
\$850, entire operating system
(multiuser)
\$500, entire operating system
(single user)
Built into Oasis 16 computer
operating system.
\$1495, entire operating system
(multiuser)
CIRCLE 264

SMOKE SIGNAL
31336 Via Colinas
Westlake Village, CA 91362
(213) 889-9340
OS-9 Level I Operating
System/requires 64k
\$200
OS-9 Level II Operating
System/requires 128k
\$500
Both operating systems include
buffer and spooler as standard
items and operate on most 6809
personal computers.
CIRCLE 265

SOUTHWESTERN DATA SYSTEMS
10761 Woodside Ave., Suite E
Santee, CA 92071
(619) 562-3670
Doubletime Printer
A software control for Apple II,
II Plus
\$99.95 includes software
package and modified F8 ROM
and interrupt card
CIRCLE 266

TECHNE SOFTWARE CORP
3685 Mt. Diablo, Suite 130
Lafayette, CA 94549
(415) 283-6824
Cache/Q Software
Accelerator/requires 48k
CP/M 2.2 and IBM Personal
Computer PC DOS-compatible
\$225
CIRCLE 267

TECMAR INC.
23600 Mercantile Rd.
Cleveland, OH 44122
(216) 464-7410
RAMSpooler/8k-64k
(user-selectable)
IBM Personal Computer
\$95 (free with multifunction
memory card: The 1st Mate)
CIRCLE 268

SPECIAL REPORT

plugs into the wall and powers the buffer.

Once the buffer is on the back of the printer, two things become apparent. First, the top of the buffer is slightly higher than the top surface of the printer, so it impedes the paper-feed path. This can be solved by bending the hooks the paper bail rests on so the paper will clear the bail. Second, the connection between the buffer and the printer isn't terribly secure—the buffer is held on by two thin screws through the electrical connector. This causes some sort of signal glitch or power glitch as paper moving over the buffer makes the buffer move with respect to the printer. The glitch causes the printer to behave in unpredictable ways. My solution was to tape the buffer to the printer with some duct tape. The problem went away. Quadram says it no longer makes this particular version of the Microfazer, but if you find one in a store, or if you already have one and you're having the same kind of difficulty, my solution might help.

The fancy buffers

Sophisticated buffers are really quite a bit more than buffers. Some of them could almost qualify as network controllers, although they don't han-

dle the variety of peripherals a network controller can. The Smartbuffer from Data-Match Corporation in Doraville, Ga. illustrates the kinds of things you can do with the more sophisticated buffers.

The Smartbuffer, according to Data-Match, is really a buffer *and* a spooler. That means it can take control of the printer and make it perform tasks beyond storing the data for later printing. Typically, such a device will contain a microprocessor, some ROM with a control program in it, and the buffer RAM. The buffer/spooler will act like a dedicated computer whose only function is to handle I/O. The Smartbuffer can handle eight different peripherals in a combination of multiple computers and multiple I/O devices. The I/O devices do not include disk drives, which need drive-control electronics, and are another kettle of fish.

But the peripherals can include modems. This raises some interesting possibilities. You could, for example, send a file to the I/O port that's been connected to a modem at 19,200 baud, and then have the modem send the information out over the phone lines at 1200, 300, 110 or whatever baud rate your connection requires. The time saving could be enormous,

as anyone who's transferred a long file at 300 baud can testify.

The same thing is true for printers, of course. A 55-cps printer can keep up with transmission at 1200 baud; 1200 baud sounds fast, but 55 cps is slow. Using a device like the Smartbuffer, you can connect a slow serial printer and a relatively fast parallel printer to the buffer. Then you can connect two computers to the input side of the device. The user who is working on a spreadsheet can send his printout to the parallel printer, while the word-processing user can get access to the serial printer for letter-quality printing. Or they can switch the printers they access. Or, both users can send the print job to the same printer. The Smartbuffer will automatically establish a print queue for the jobs, and print them one after the other.

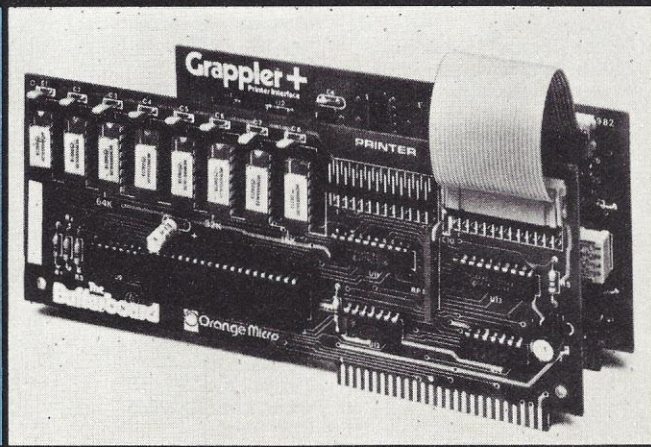
Print and transmit

Then too, you might have a report that's just been finished and needs to be in the home office across the country right away. You also need a file copy, plus copies to distribute in the branch office. No sweat. With a modem hooked onto a serial output port, and a printer on another serial, or a parallel port, the buffer will send the

Smartbuffer is a 16k buffer (user-expandable to 256k) from Data-Match Corporation that can be used with either RS-232 serial or Epson Centronics parallel data.



Grappler Plus from Orange Micro Inc. is a graphics printer interface card with a built-in 16 to 64k buffer for use with Apple computers and a variety of printers.



Many spooler publishers are publishers of operating systems.

text to both places. Sending information to different ports is accomplished with software commands. You would put the command to send a word-processed file to the serial printer in the beginning of the text file that is to be printed. The Smartbuffer, seeing the command string, will not print it, but will use it to route the output to the proper output device. In the meantime, as soon as your computer has downloaded your information to your buffer, you can use your computer to do something else, like look at tomorrow's schedule with your time-management system.

Spoolers

So far we've talked about hardware, or hardware/software systems which accelerate the print task. But software can do the job, too. Here the problem gets a little trickier, because you have to make sure the spooler software will run on your particular computer.

We've listed publishers of spooling software in the buyer's guide on page 81. Note that some of these publishers develop and market operating systems. Spoolers are utility programs in many operating systems, particularly those designed to run concurrent applications, or multiuser applications. Such operating systems include Oasis, Xenix, and MP/M. One single-user operating system which includes a spooler is MS-DOS 2.0, for the IBM Personal Computer and other computers which use the 8088 microprocessor.

When you get a spooler with your operating system, your fast-printing problem is already solved for you. All you need to do is run that utility from your system disk, follow the instructions on the screen or in your documentation, and you're in business.

If your operating system has no spooler utility, though, you'll have to go get one, assuming you've decided to go that route to accelerate your printing. Now you have to establish what software will run on what com-

puter. We've been able to dig up some examples.

Doubletime Printer, from Southwestern Data Systems of Santee, Calif., runs on Apple computers. This is a pretty significant feat, because while the 6502 microprocessor allows for interrupts, Apple DOS and the BASIC operating system that runs in tandem with it in the Apple manage to disable interrupts.

Cache/Q from Techné Software Corp. of Lafayette, Calif., is a spooler you can add on to CP/M operating systems. Cache/Q isn't primarily a spooler, but it handles that function along with other software buffering chores which allow it to speed up execution of CP/M programs.

Cache/Q accomplishes this, according to the company, by setting up file buffers in memory and then transferring files from disk to memory where they can be accessed quickly. This is a technique borrowed from the fastest and largest mainframes, in which a small portion of very high-speed RAM is set aside as a cache memory. When the processor in such a system calls for disk access, more than was required from the specific access call gets loaded into the cache. The probability is that the next disk access will need information already in the cache, so the information from the disk can be accessed at memory-to-memory transfer speeds, rather than the much slower disk-access speeds.

File manipulations


Cache/Q works in much the same way, setting up a portion of the normal memory in a CP/M system as the cache, and allowing you to perform various file manipulations through the cache. Since the printer in a CP/M system is a file, using Cache/Q to do printer buffering is simply a matter of designating the correct files for the task. Cache/Q is also available for MS-DOS, if you have the earlier versions without the spooler options.

Also for the IBM Personal Computer is RAMSpooler, from Tecmar Inc. in Cleveland, Ohio. This is a program which partitions RAM inside the computer and interrupts the processor to accomplish the print task. Externally, you see no difference between this program's operation and that of a buffer. After you install the software, which the company says is a simple operation, you merely run the program when you want to print. The computer loads up your print buffer and printing begins. For all intents and purposes, control is returned to you at this point, and you can do something else while printing continues. Tecmar says the operation makes the computer system look like it is accomplishing the print task and your other task simultaneously.

RAMSpooler will run with almost any size print buffer. Tecmar says it will run in a 64k IBM Personal Computer. What you sacrifice in doing this, of course, is the memory you've declared for a print buffer. While that memory is handling the print task, your main program can't access it for data storage and the like.

The choice is yours

Your whole purpose in getting a device like those we've discussed—be it hardware or software—is to find a way to speed up your computer. You can do it in two ways. Connect a piece of hardware that's essentially external memory with a controller to take over the print task. This option can get you either a simple printer controller and printer memory, or a smart peripheral which can actually manage much of your I/O handling. Or use a spooler that's in your operating system, or get a separate one that works with your operating system. Such a program will likely cost less than a hardware buffer and accomplish the same function, with a temporary sacrifice of memory.

It's nice to have two different approaches to the solution of the same problem, isn't it? 

Introducing SooperSpooler's™ Little Brother

Who knows spoolers better than Consolink? We pioneered this industry with our revolutionary SooperSpooler, the Intelligent Printer Interface.

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Making Mailing Lists More Personal

As businessmen who maintain their own mailing lists are discovering, precisely targeted communication can increase productivity and profits

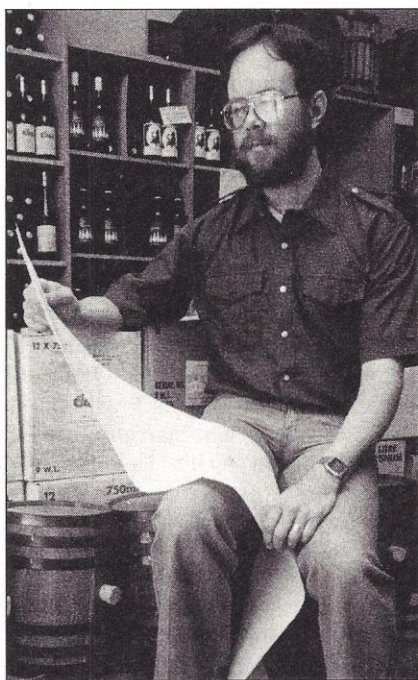
by Craig Zarley, Associate Editor

No businessman wants to send information through the mail to someone who doesn't want to see it. Yet in the age of computerized mailing lists, that's all too often what happens. You purchase from a marketing research organization a list of names of people who you think most closely match the profile of your customers, send out a mass mailing, and hope for the best.

Many times the best is not good enough. No matter how hard you try or how much you pay, it's virtually impossible to buy an institutional mailing list with enough detail to identify the customers you are trying to reach. As a result, you waste money by promoting your products or services to people who can't use them. And your expensive computer mailing list just adds up to more junk mail.

But with a personal computer you can solve many of your mailing list problems by creating and maintaining your own file of people with whom you regularly communicate. By using the personal computer to store, update, and manage these names yourself, you can get information quickly to the people who need it. What's more, with personal computers you can maintain lists that are far more comprehensive than mere name and address files.

With data-base software, for example, a salesman can keep complete



Alan Tobey of Wine and the People uses a computerized mailing list for market expansion and promotion.

account files for his clients. Not only can he sort and reference complex customer data, but by keeping names and addresses updated with the personal computer, he also maintains an accurate mailing list. He can then use the computer to target people who match certain profiles. And by communicating the right message to the right person, he has turned random marketing into precision surgery.

This same salesman might even use his word-processing software as a personalized mass mailing tool. Most packages let the user merge a list of names and addresses with a single form letter, adding a personalized touch to business communication.

For businessmen and individuals who depend on mass mailings of catalogs or brochures for their livelihoods packaged mailing-list software provides a powerful list maintenance and sorting tool. Anyone who has addressed several hundred Christmas cards by hand can appreciate the value of computer-generated address labels. But for a businessman who must keep accurate address information for thousands of clients, mailing-list software and a personal computer can mean financial survival.

Questions of speed

Printer speed and print quality are prime factors in using the personal computer to compile mailing lists. For the user who only wants to produce mailing labels, a high-speed dot-matrix printer is probably required, together with a software package that allows for printing multiple horizontal labels. But the businessman who needs to mail 500 to 600 personalized form letters a week has some added requirements. For him, a mailing list requires letter-quality print, and those printers can be painstakingly slow.

One way to solve this problem without buying a high-speed letter-quality printer may be the U. S. Postal Service. A service called E-COM (Electronic Computer Originated Mail) lets you send an address list and a form letter directly from a personal computer via modem to the post office. The postal service then merges the names and addresses with the letter and prints them on bonded paper. The letter is then folded into an envelope and mailed first class.

The print quality is relatively high (the postal service calls it "double dot-matrix") and the price is definitely right. A one-page letter costs only 26 cents including postage, while a two-page mailing is 31 cents. Two pages is the maximum for an E-COM letter. The only other costs are phone charges, if any, incurred during data transmission, and an annual \$50 account maintenance fee.

"Quality bonded paper is used in the mailing," says Nelson Wong, E-COM sales and service representative for the San Francisco Post Office. "And the customer saves money and effort because we supply the paper and the labor. We have people with TRS-80s, Apples, Osbornes, and IBM Personal Computers using the service. It's compatible with just about any microcomputer."

Getting approved

If you're a salesman or a small businessman who regularly communicates with a large number of people, the service could be ideal. You don't have to purchase paper or envelopes for your mailings, you don't have to wait for the printer to crank out the letters, and you don't have to fold them or carry them to the post office when they're finished. And E-COM mail sent to one of the 25 regional post offices equipped to handle transmissions is guaranteed to be delivered within two days in the serving area, traveling elsewhere as normal first-class mail.

Before you rush down to the local

post office to sign up for E-COM, remember that you're dealing with the government. While the service seems like a great idea, E-COM is in many ways like a stamp without the glue. In order to set up a communication link with an E-COM center, you must first go through a certification and testing procedure to ensure that your data is formatted correctly. Fair enough. E-COM's brochures claim the service can communicate with software from almost any personal computer.

But the catch is, the government provides no E-COM formatting software. What you get is about an 80-page document called E-COM User's Technical Guide. The book explains exactly how messages are to be designed and warns that any deviation from the prescribed format will not be transmitted. Although exact specifications for formatting blocks of text are included, even an experienced programmer could have difficulty wading through the manual.

But, says Ron Cossa, technical support manager at the Office of E-COM Operations in Washington, D.C., "Anyone who can program in BASIC could write the E-COM formatting software in less than a week, working part-time. And software vendors offer E-COM formatting packages for between \$100 and \$200."

And he notes that technical assistance is provided free to the user during E-COM certification, adding that the prospective customer must complete a successful test data transmission before he is certified.

Probably the best way to go about hooking up to the service is to first contact your local E-COM sales rep and see how much technical assistance the post office really provides. If you remain unconvinced that data formatting is as easy as the government leads you to believe, contact one of the software vendors listed in the chart accompanying this article. The post office can also provide a current

list of companies offering E-COM formatting packages.

One user compared setting up a communications link with E-COM to "going through a 1040 form for the first time." The best thing about E-COM, however, is that once you've gone through the hassle of getting certified you don't have to repeat the procedure annually. But you're required to set up an E-COM account with the post office in which you deposit sufficient funds in advance to cover all mailing costs.

Cossa says only 200 to 300 companies have been approved as E-COM customers so far. He says most of them use mini and mainframe computers for E-COM transmissions, but he estimates about 10 percent transmit data from personal computers. But all that may soon change.

Until recently, E-COM had adhered to the 200-letter minimum requirement service, a rule which has been in place since the service was established in January 1982. But in April the postal service filed for a rate change that would abolish an item limit. This means anyone who pays the accounting fee and becomes certified can use the service just like electronic mail to send single letters to whomever they wish. If too many people rush to use the service, local E-COM phone entry points could become jammed, diminishing the appeal of the service. Another drawback is that no signature can be affixed to the letter, which removes some of the "personal" touch from communicating via E-COM.

But as a quick and relatively inexpensive way to use a personal computer for mass mailing, the service is definitely worth checking out.

Packaged survival

For some small businessmen, generating their own mailing material with a personal computer greatly enhances productivity. For others, with thousands of clients who purchase goods and services through the mail,

"Our mailing list is the basis of our promotion and market expansion."

maintaining and manipulating a mailing list can be a matter of survival. A small mail-order business, for example, must be able to target customers accurately and then make sure promotional material gets to the right address. Sending sales brochures or catalogs to wrong addresses or to people who can't use the product will cost the small businessman a fortune in postal charges.

One small business which lives and dies by the mailing list is Wine and the People, a Berkeley, Calif., home wine- and beer-making supply company. Wine and the People has gone a long way in expanding its business by using packaged mailing-list software on its Apple IIe computer.

"Wineries and home beer-makers are scattered everywhere, so newspaper advertising doesn't do very well," explains Alan Tobey, the company's manager of home wine-making and brewing supplies. "We would be dead without our mailing list. It's the basis of our promotion and market expansion."

Wine and the People's mailing list of 16,000 names is complicated by the fact that it has several well-defined but not overlapping customer segments. The company sells commercial wine-making equipment to small- and medium-size wineries. It also sells bulk wines and wine-making supplies to individuals and beer-making equipment and ingredients to home brewers.

"One of the benefits of converting to a computerized mailing list is that we will be able to identify our customers better," says Tobey. "Not too many people are both wine and beer makers, and we need to target which customer is which."

The company had been keeping its mailing list on cards and updating it manually. Address labels were typed, and when catalogs were mailed, they were run through a machine which left a mimeograph print of each address. "We were constrained by the machine because it was designed to

WHERE TO FIND E-COM

Finding out how to hook up your personal computer to the post office and E-COM can be an adventure. The post office estimates that only 300 individuals and companies are E-COM users. One reason is that few people have heard of the service. If you call a post office which is not an E-COM center, you may very well be greeted by a "never heard of it." The following is a list of post offices around the country which offer E-COM, and the telephone number of the local E-COM sales representative.

Office of E-COM Operations USPS Headquarters, Rm 6636 Washington, DC 20260-7140 (202) 245-5780	Kansas City, MO 315 W. Pershing Road Kansas City, MO 64108 (816) 374-9145	Phoenix, AZ 1441 East Buckeye Drive Phoenix, AZ 85026 (602) 261-3272
Atlanta, GA 3900 Crown Road Atlanta, GA 30304 (404) 763-7161	Los Angeles, CA 900 North Alameda Los Angeles, CA 90052 (213) 668-3838	Pittsburgh, PA Seventh Avenue & Grant Street Pittsburgh, PA 15219 (412) 644-6461
Boston, MA 75 Dorchester Avenue Boston, MA 02109 (617) 223-2558	Milwaukee, WI 345 W. St. Paul Milwaukee, WI 53203 (414) 291-1415	Richmond, VA 1801 Brook Road Richmond, VA 23232 (804) 771-2892
Charlotte, NC 2901 S. Interstate 85 Charlotte, NC 28228 (704) 393-4463	Minneapolis, MN 100 First Street South Minneapolis, MN 55401 (612) 349-5828	St. Louis, MO 1720 Market Street St. Louis, MO 63155 (314) 425-5882
Chicago, IL 433 W. Van Buren Street Chicago, IL 60607 (312) 886-3130	Nashville, TN 901 Broadway Street Nashville, TN 37202 (615) 251-7106	San Antonio, TX 10410 Perrin Beitel San Antonio, TX 78233 (512) 229-5987
Cincinnati, OH Liberty Street & Dalton Street Cincinnati, OH 45234 (513) 684-5018	New Orleans, LA 701 Loyola Avenue New Orleans, LA 70113 (504) 589-2211	San Francisco, CA 99 Mission Street San Francisco, CA 94119 (415) 550-5238
Dallas, TX 401 Dallas/Ft. Worth TP Dallas, TX 75212 (214) 767-6655	New York, NY 341 Ninth Avenue New York, NY 10001 (212) 971-5394	Seattle, WA 3rd South & Lander Seattle, WA 98134 (206) 442-2400
Denver, CO 1501 Wynkoon Denver, CO 80202 (303) 837-2814	Orlando, FL 10401 South Florida Road Orlando, FL 32812 (305) 855-6130 EXT. 286	Washington, DC N. Capital & Massachusetts Ave. Washington, DC 20013 (202) 523-2229
Detroit, MI 1401 W. Fort Street Detroit, MI 48233 (313) 226-7880	Philadelphia, PA 30th & Market Street Philadelphia, PA 19014 (215) 596-0444	

E-COM SOFTWARE VENDORS

If you're overwhelmed by the E-COM technical guide and don't want to hassle with formatting your own messages, some software vendors now offer E-COM formatting packages. Here is a sampling of vendors who offer E-COM software for personal computer users.

Barrios Technology Inc.
16902 El Camino Real, Suite 3A
Houston, TX 77058
For the IBM Personal Computer
(713) 480-1889

Fogle Computing
P.O. Box 5166
357 East Blackstick Road
Spartanburg, SC 29304
For IBM Personal Computer
(803) 574-4950

Cedar Systems
220 W. Washington, Suite 300
Marquette, MI 49855
For CP/M-compatible computers
(906) 228-8280

Lifeboat Associates
1651 Third Avenue
New York, NY 10028
For CP/M-based microcomputers
(212) 860-0300

Com-Co Communications
Consultants Inc.
900 Madison Street
Seattle, WA 98104
For Apple Computers
(206) 622-6430

Micro Development Software
Services
228 Weyman Avenue
New Rochelle, NY 10805
For North Star, Altos, and
CP/M-based machines
(914) 576-1429

Epic Communications Services
Inc.
811 Jackson, Suite 100
Richmond, TX 77469
For Microcomputer CP/M
Systems, Televideo TS-802, 802-H,
806, and 816
(713) 341-0716

Network Inc.
P.O. Box 444
College Park, MD 20740
For the IBM Personal Computer,
Apples, and Radio Shack
computers
(800) 222-3266

The Family Network Inc.
15438 Meyers Road
Detroit, MI 48227
For TRS-80 Model II
(313) 341-6473

Federal Systems Group Inc.
P.O. Box 57165
Washington, DC 20037
For IBM Personal Computer,
Apples, TRS, and DOS or CPM
systems
(202) 857-0200

Zipco, Inc.
400 Quivas Street
Denver, CO 80204
For IBM Personal Computer
(303) 534-3097

address envelopes, and no catalog thicker than 32 pages would fit through it," says Tobey.

Bombproof list

But he confesses that the toughest thing about switching to a computerized mailing list was convincing his boss. "The way computing came to Wine and the People is fairly typical for a small company. We were initially skeptical about buying a computer, but what happens is that one person at home has one and then takes the lead in bringing it into the business. In our case, I was that person."

Tobey's search for the best solution to his mailing-list difficulties was a methodical one which resulted in the purchase of Bulk Mailer, a packaged mailing list software package from Satori Software. "Our number one goal was not to speed up the mailing process," he explains, "but to maintain an accurate list of names. I considered creating files with data-base software. But the mailing-list software was cheap, easy to use, and did what needed to be done. It wasn't worth my time to design data-base files."

What did Tobey consider first when buying mailing-list software? "It had to be bombproof. One that made it virtually impossible to lose data, because if we zap our mailing list, we're in deep trouble."

Beyond that, he wanted to be able to maintain a reasonable number of names on a single disk, coding for sub-mailings from the master list, and ease of file additions and corrections.

Tobey uses his mailing system primarily for label production, so print quality wasn't a major consideration in his choice of a printer. "At 100 cps, our printer is fast enough for what we need. The mailing-list software has the ability to print four labels across, but we just do one. That makes it easier to keep the mailings in order when we are sticking on the labels."

By printing only a single label

Our number one goal was to maintain an accurate lists of names.

across, Tobey figures he sacrifices 30 percent in printer speed, but the speed at which labels are produced is often dependent on the software, not the printer. "You should be careful to choose software that loads as many labels as possible into memory and then shoots them out to the printer all at once. And make sure your printer has about a 2k memory buffer. That way it can store labels while the computer is working and the printer will always have something to do."

Identifying the customer

With Bulk Mailer, Tobey can identify customers by account number, by name and address, or by a code specifying whether the person is a beer or wine consumer. Once names are entered into the computer, (about 1200 addresses fit on a single diskette,) customers can be sorted by name, number, ZIP code, product preference code, or any combination of the above.

"We mainly rely on the customer number to keep the list current," says Tobey. "If, for example, a mailing for customer number 67 comes back with the wrong address, we just call up that number on the computer and correct it in a few seconds."

The software also has the ability to sort through files and spot close matches which are then displayed on the computer terminal. For example, two retail wine shops which purchase supplies from Wine and the People might have the same name. While someone manually updating the file might inadvertently discard one of the addresses, someone viewing them on a computer could instantly see they were two separate accounts. Likewise, if two customers had almost identical names and the same address, the computer operator could purge one from the file, reasoning the names were duplicates.

Tobey sees one drawback to mailing-list software, however. "One place where packaged mailing-list software is not up to the state of the

art is its sort routines. Some sorts on a diskette containing 1200 names can take a half an hour or more."

To illustrate his point, he removes a data disk and exercises a close-match search. This will identify similar file entries such as retail shops with the same name. Then he waits.

Bulk Mailer advertises itself as having the "Fastest Possible Sort", but after about 10 minutes the program is still chugging along and has found only two wine shops in Ohio with the same name. Tobey finally aborts the search.

To solve this problem, he purchased Amper-Sort/Merge software, a utility that sorts mailing lists 10 to 15 times faster than his mailing-list software. But he cautions, "Amper-Sort/Merge is for the expert user. You have to know how many bytes are in each record and the order of the fields on the disk. But aside from the sorting drawbacks, I'm pleased with the software. I was extra cautious in choosing it because of a friend who had a disaster with his mailing list."

The disaster of which Tobey speaks could serve as a warning to anyone about to computerize a mailing list. While Wine and the People found a "bombproof" solution to its problems, Trumpetvine Wines of Berkeley walked into a mine field.

"A mailing-list program completely trashed my files," moans Jim Brandley, managing partner of the company that sells wines from small California wineries. Brandley writes and mails a wine newsletter to over 1600 people throughout the country. He used to type the mailing labels and print copies for each mailing.

"The reason we wanted to go to a computerized list was because we needed something that could automatically sort into ZIP codes for bundling and mailing," he explains. "And we wanted to assign numbers to each computer label to make it easier to identify people for address changes and deletions."

Brandley, who confesses he knew nothing about computers at the time, decided to buy Addressbook mailing-list software by The Muse Company from his local Computerland store. "My roommate had an Apple II with 32k memory," he explains. "Addressbook seemed to do everything I needed so I bought it. The Apple II had a 3.1 DOS operating system. The software company claimed Addressbook would run under 3.1, 3.2, or 3.3 DOS, and that's where my trouble began."

Brandley transferred his mailing list to three diskettes and says the software worked fine on the Apple II. But soon after he converted his files, his roommate moved away, taking the computer with him. Brandley took his data disks and began running his mailing list on Alan Tobey's Apple II plus with 64k memory and a 3.3 DOS operating system.

As Brandley tells it, "Addressbook has several category codes that I don't use, such as phone numbers. When I went through the files, I would just hit RETURN to skip over those codes. What happened on Alan's system was that I was going through and correcting files. I hit RETURN about five times in a row to skip over categories I wasn't using, and suddenly my data diskette was trashed."

At this point he would have been wise to follow the axiom, "When lost in the woods, stop and get your bearings." But he kept going, trying to get the software to work. When he was finished, two of his three mailing-list data disks were ruined. And what's worse, he tried to make the same changes on his backup disks. The result—two-thirds of his mailing list was completely lost.

He figures now that the program understood the first RETURN, but was not sophisticated or fast enough to deal with several RETURNS in rapid succession.

"I took the software and the disks back to Computerland and they couldn't figure out what was going

ONE



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CIRCLE 76

Operating 3.1 DOS on a 3.3 system was like having a dinosaur live in a modern city.

BUSINESS

on," he continues. "I then sent the disks and a letter explaining what had happened to Muse. I asked them to retrieve the names if nothing else. Within 10 days I got a letter back saying, 'Disks are completely trashed. Returning them for last rites and burial.'"

In one last attempt to retrieve his list, Brandley sent the software and data disks to his former roommate who had helped initiate his mailing-list adventure. The friend cracked the program, updated the software to run on 3.3 DOS, and rescued the lost list of names.

"My friend said operating 3.1 DOS on a 3.3 system was like having a dinosaur live in a modern city," he says. "Things were completely out of whack."

The revamped Addressbook works fine now, but Brandley has words of caution for anyone about to computerize a mailing list. "Despite what the software company says, make sure you get a program that's specifically designed for the system you have."

And as with his friend Alan Tobey, Brandley laments the sorting routine drawbacks of mailing-list software and offers some advice on how to beat it. When he first entered names on his data diskettes, he put them in alphabetical order. But when he does a mass mailing, he sorts files by ZIP codes to conform with the post office's 10-item bundling requirement. This means that names of his Berkeley customers, for example, might be on three different diskettes. When he prints labels and affixes them to his newsletters, he often has several small stacks going to the same ZIP area, forcing him to count each pile to make sure it adds up to 100.

"It's best to analyze how many names you can hold on a disk," he suggests. "Then, if you have say 500 names in the same geographic area, keep them on a separate disk. This will mean you won't have to count through a bunch of little piles when you're bundling the mail. And if you

A MAILING LIST SOFTWARE SAMPLER

While data-base and word-processing software can work well in creating and maintaining a mailing list, some users prefer packaged mailing list programs.

The packaged software makes sense, especially if your mailings consist of pamphlets, catalogs, and other preprinted material which requires nothing more than a mailing label. The packaged mailing software's forte is list maintenance, and if your business depends on mass mailings to customers who are relatively easy to identify, a dedicated mailing program could be your best bet.

ADDRESSBOOK

The Muse Company
347 North Charles St.
Baltimore, MD 21201
(301) 659-7212
Apple II and IIe
\$49.95
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MAILING LIST II

Radio Shack
300 One Tandy Center
Fort Worth, TX 76102
(817) 390-3300
TRS-80 Models II, 12, and 16
\$119
Contact your local Radio Shack
dealer or Computer Center

BULK MAILER

Satori Software
5507 Woodlawn Ave. N.
Seattle, WA 98103
(206) 663-1469
IBM Personal Computer;
Apple II, IIe
\$125 for diskette version, \$350 for
hard disk version compatible with
Corvus and Davong hard disks
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MAIL LIST AND LABELS PAC

Tensegrity, Inc.
2424 Addison
Chicago, IL 60618
(312) 935-9714
Hewlett-Packard 80, 85, 86,
and 87
\$145
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DATA LIST MANAGER

Peachtree Software, Inc.
3445 Peachtree Rd. NE
Atlanta, GA 30326
(404) 239-3000
Most 8- and 16-bit personal com-
puters including Apple, IBM Personal
Computer, and TRS-80 Model II
\$250
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MAIL LIST MANAGER

Apple Computer, Inc.
20525 Mariani Dr.
Cupertino, CA 95014
(408) 996-1010
Apple III
\$150
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INFOMANAGER II

North Star Computers, Inc.
14440 Catalina St.
San Leandro, CA 94577
(415) 357-8500
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corporates a mailing list. Com-
patible with North Star computers
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MAILTRACK

TCI Software
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Flourtown, PA 19031
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When you're manipulating 4000 names, speed is of the essence.

BUSINESS

do a ZIP sort routine, the program can search for and print labels faster. Right now, I have to wait five to six seconds between label printings because the ZIP code sort is so slow."

And he adds, "Basically, just plan ahead. My experience was definitely one cruel lesson."

Mailed in Hawaii

For businessmen who must keep more extensive information on clients than just an address label, however, data-base software may solve mailing-list problems. With complex information on file under each name, a more detailed search routine can be launched. And for some businessmen, targeting who to send letters to can be just as vital as mass mailings.

Made in Hawaii is a trade association whose member companies sell consumer products such as Hawaiian jewelry, gifts, and clothing to retailers throughout the country. Made in Hawaii uses DB Master data-base software and an Apple II plus with 48k memory and two disk drives for its mailing list of more than 8000 names. The system uses an Epson MX-100 dot-matrix printer with a speed of 100 cps.

"We thought about buying packaged mailing-list software, but we wanted to be able to sort through more information than appears on a mailing label," says Bill Pumphrey, executive director of the association. "And our products have to be sold in stores that recognize the special qualities of Hawaiian products. No purchased mailing list can give us that."

Pumphrey says that with the DB Master files, he can sort through the lists by the type of store, such as a chain or independent department store, or by 10 different product codes. In addition, he can identify which retailers have attended specific trade shows held periodically on the islands.

"This is an extremely valuable list of information for a businessman trying to develop contacts," explains

Pumphrey. "We used to have to pay typists to compile the lists of people who attended shows. That was slow, expensive, and prone to typing errors. We can do it three times faster now, and we've saved enough money in just two shows to pay for the computer."

And not only can association members instantly identify which buyers attended a specific show, they can obtain extremely detailed marketing information from the DB Master files. By entering a store code, ZIP code, and product code for example, all independently operated Los Angeles area boutiques that sell men's Hawaiian shirts can be identified.

"It will take till hell freezes over to sort out the information," says Pumphrey. "But it can give you a very specific list."

Disk swapping

Pumphrey notes that about 1000 names can be stored on each disk, which can add to the slowness of a sort routine using data-base files. When the trade association has a lot of new names to add to its list, it generally collects the names on a single diskette and lets the software merge them in automatically. The surname is the primary file entry, and names are stored alphabetically on a series of disks. Name was chosen as the initial entry because the association is more concerned with identifying specific customers for marketing purposes than for rapid sorting by ZIP codes. But as with packaged mailing-list software, data-base files have their sorting drawbacks.

"When you're merging names into the list, you can go crazy disk swapping," he says.

He says the association will eventually go to a hard-disk system with a much greater storage capacity, which should alleviate some of the delays. And Pumphrey is working on writing a good sort routine for the files.

"If you're not searching through the primary or secondary file entry,

sorting can take forever," he complains. "When you're manipulating 4000 names, speed is of the essence. With a sort routine, we should be able to obtain needed data infinitely faster."


One area where speed has not been a problem is the actual printing of mailing labels using DB Master. Twice a year the association mails out a magazine, *Hawaiian Showcase*, which is a buyers guide for the 8000 retailers on whom files are kept.

"We have an Epson MX matrix printer that cost us less than \$1000 and it's performed like an absolute workhorse," says Pumphrey. "We just print labels one across because it's easier to keep track of the names, but for anyone who's printing a lot of labels, they had better have software that can print four or five across or they'll melt down their printer in a hurry with all the carriage returns."

Pumphrey has learned firsthand that controlling your own mailing list can greatly increase productivity and profits. Before Made in Hawaii compiled its own customer records using an Apple and DB Master, it used to purchase Dun & Bradstreet mailing lists of retail stores with annual sales between \$500,000 and \$2 million.

"There were 50,000 names on the list," explains Pumphrey. "We paid nearly \$20,000 for one mass mailing and we only got about 150 responses."

That means the association not only wasted money on buying the list, but also on printing and postage costs for the brochure. And association members lost even more by not expanding their markets. But now, instead of 50,000 misses, Made in Hawaii gets 8000 hits everytime it mass mails.

"When I was hired as director and saw what was happening, I immediately put an Apple in the office, and we haven't bought an institutional mailing list since. By keeping our own client records, we've probably saved enough money to buy an IBM mainframe." 

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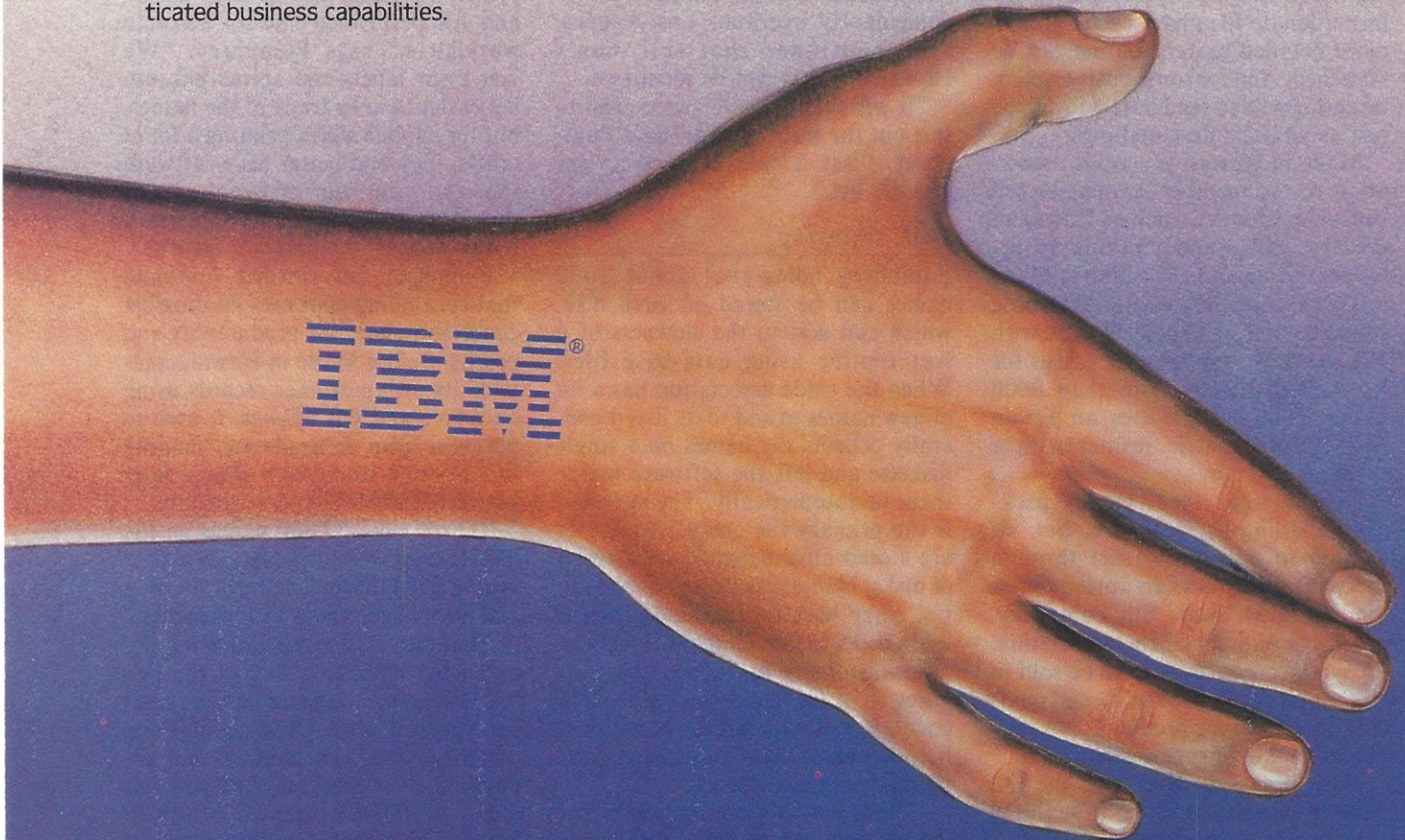
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Learning A Language

When it comes to learning a foreign language, a computer can't replace a good teacher. But it can make learning faster and easier

by Craig Zarley, Associate Editor

If you want to learn a foreign language, your personal computer can help. An increasing number of students and teachers are proving that personal computers, with or without special software, can be effective aids in learning any language.

Two people who have discovered the value of personal computers in language study are Paul Cozens and his daughter Caroline of San Jose, Calif. Three years ago, both Paul and Caroline were struggling to learn languages foreign to them. While Paul wrestled with BASIC on his Apple II personal computer, Caroline, then 14, struggled with German in school. Paul was making the greater progress.

"I was working as a corporate headhunter at the time," explains Paul. "I was hired by a computer retail chain to recruit a salesman. When they asked me what my fee would be, I pointed at an Apple II and said, 'I'll take one of those.'"

Paul, who had never used a computer, set up the system in his home office. Then, as he tells it, he found himself faced with the dilemma of "Here is my new computer, now what do I do with it?"

"Being a working nut, I finally succeeded in teaching myself BASIC," he says. "I started taking war board games and writing programs so they could be played on the computer. Meanwhile, Caroline was having

trouble with her German. To help her out, I wrote a simple vocabulary prompter program that essentially worked like flash cards."

Caroline began using the prompter to study her German and English vocabularies. The program allowed her

with the vocabulary program.

"I got into her word lists and accidentally scrambled them," says Paul. "When I tried to put them back together, they were in a different sequence."

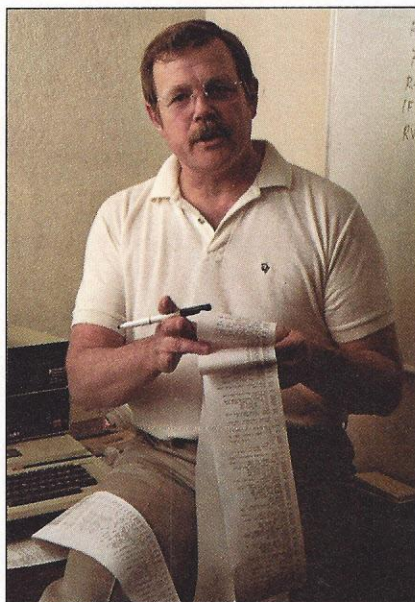
"I could have killed him," says Caroline. "When I studied my list before, I knew it so well I could tell you the next ten words and the previous ten words at any point in the list. But when they were out of sequence, I was lost."

Scrambled memory

It was then that Paul discovered Caroline was memorizing the list and not the words themselves. He went back to his personal computer, determined to create a vocabulary program that would not only let someone studying a language create his or her own vocabulary list, but that could scramble the words as well.

"Once we put in the scramble routine, she memorized the vocabulary just like that, because she was learning the words and not the sequence," he says.

Caroline's dramatic improvement in German made Paul decide to go into the software business. So, instead of working full time as a headhunter, he formed Jagdstaffel Software, writing and marketing his language programs from home. And Caroline, with a little help from her father and the personal computer,



Photos by Lee Youngblood

Paul Cozens used his personal computer to design software that helps people learn foreign languages at home.

to type in a word and, in the case of German, its English equivalent. For English vocabulary, she entered words followed by their definitions. But one day, her father became a bit too ambitious while tinkering

"Once we put in the scramble routine, she memorized the vocabulary just like that."

has made great strides in mastering German.

Thus, with a little ingenuity, Paul and Caroline have joined the growing ranks of people who are discovering that personal computers are ideal tools for teaching language. Their self-designed home-study program helps a person learn almost any language using a personal computer.

Caroline beats German

"I went in to take my first German test after using the revised language prompter, and I knew everything on

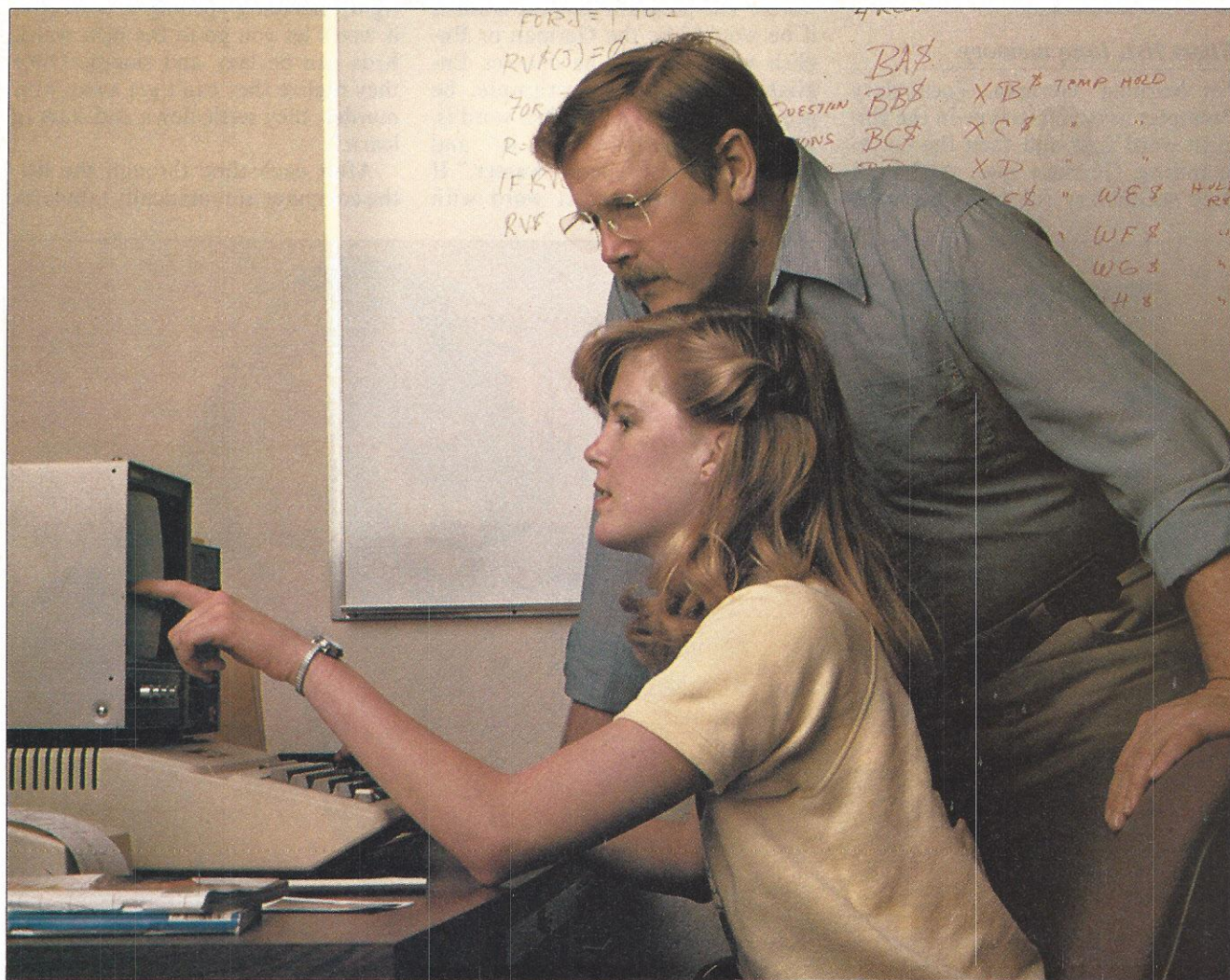
the test," says Caroline. "It was weird; I just wrote it out in about five minutes and looked around the room, and all the smart kids were still working. It took everyone else 15 minutes to take the test. I couldn't believe it. And I got an A on the paper."

The revised program, sold under the name Vocabulary Prompter, lets the language student create a vocabulary file of up to 50 words. Multiple files can be stored on a diskette, letting the student retain a limitless vocabulary list.

To create a language study list, the

student chooses "Create New Data List" from the program menu that first appears on the screen. Then the user is asked to type in the name of his new data file. The next option screen asks whether the student is working with sentences. The program is set up to accommodate a variety of question-and-answer study modes. For example, when Caroline used the program for English vocabulary, she entered a single word followed by a definition of the term.

When sentences or phrases are involved, such as those used in defining



Cozens wrote a vocabulary prompter program to help his daughter, Caroline, study the languages she was learning in school. As a result, Caroline feels more confident that she is learning each language, and not just memorizing it.

*The computer helps you
learn words, not
memorize vocabulary lists.*

a word, the scramble feature is not activated. The language student, therefore, may benefit most from the single-word vocabulary lists that automatically quiz users in a random sequence.

"Vocabulary Prompter works for any language that has a Latin character set similar to English," notes Paul. "French, German, Spanish, Norwegian, and Danish can all be studied using the program. And we also have Super Prompter programs which translate the standard English keyboard into Russian Cyrillic and Japanese Katakana."

Short list, long memory

For learning German, Vocabulary Prompter asks you to type in the English word first and then the corresponding German one. Although each vocabulary file holds up to 50

sets of words, Caroline says studying 15 to 20 at a time seems to work best for her.

"You can memorize faster with a shorter list," she explains. "Even when I have 500 words to learn, I study them in small groups. The words seem to stay in the back of your mind when you learn incrementally, because with the computer, you're learning the words and not the list."

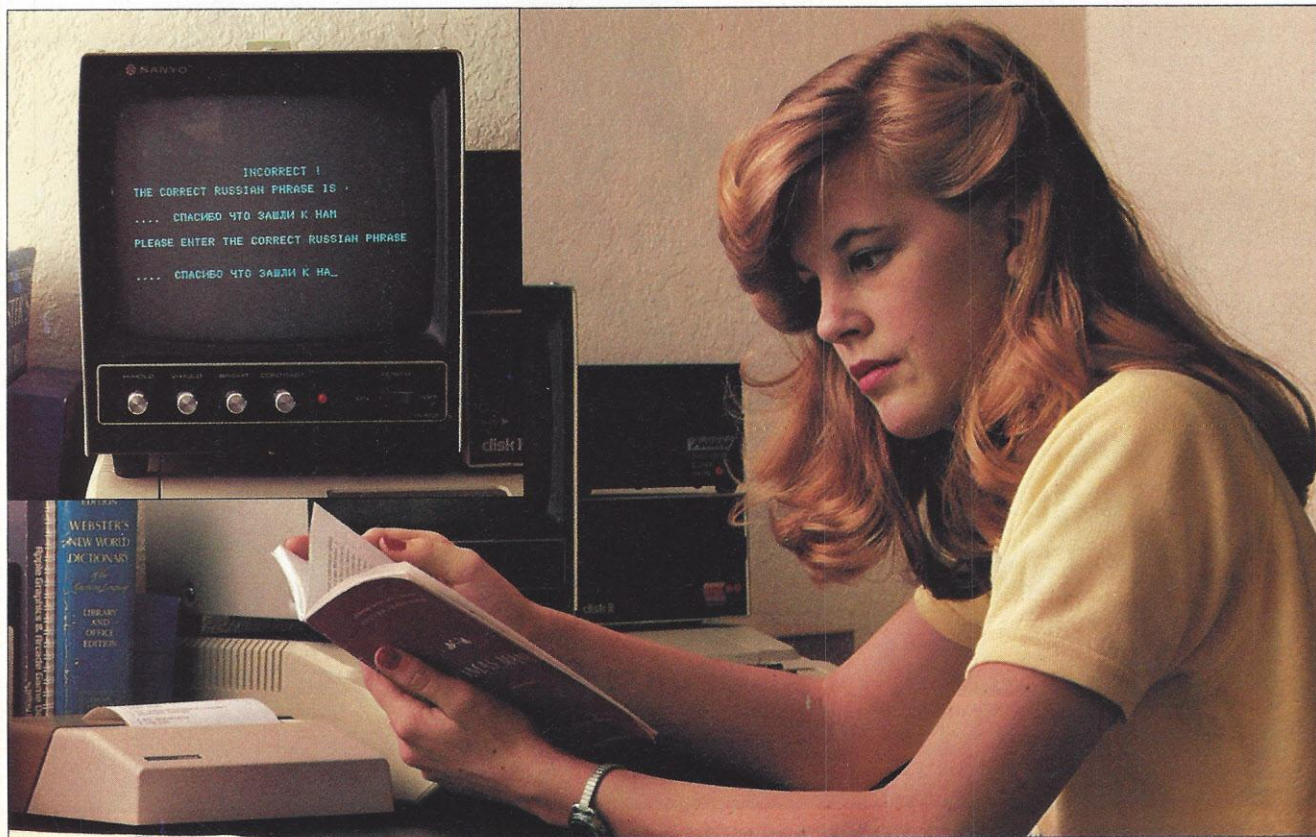
Once the language file has been created, the student using Vocabulary Prompter is ready to study the words. The program asks the student if he would like the German or English word first. If he chooses English, he would, for example, be prompted with "The English word is: water. The German word is:" and the student must type in "wasser." If he types in the correct word with

the proper spelling, the next word appears, randomly selected from the list.

If the student misspells or types in the incorrect German word, the computer flashes "Wrong!" on the screen, followed by the correct translation. But before the student goes on to the next word, he is asked to "Please enter the correct German word," which he sees displayed on the screen.

"The program gently slaps you alongside the head," says Paul. "It says, 'Here is the correct word, please put it in.' And if you don't put it in right, including spelling it correctly, it won't let you go to the next word. Kids can be lazy and sloppy. Once they realize they can't get away with murder, they settle down and start to learn."

After each time through the list, the computer automatically tabulates



If Caroline makes a spelling mistake or enters the wrong word, a message flashes on the screen to let her know (inset).

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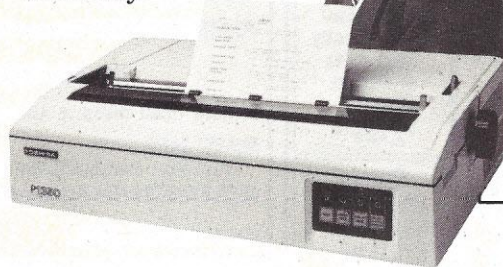
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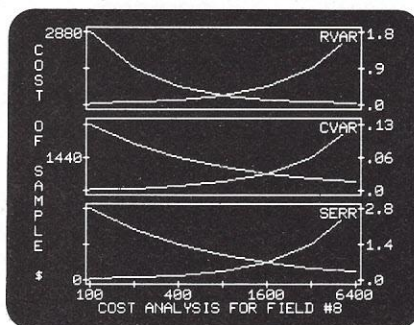
Statistics Modules Menu

- A) DESCRIPTION
- B) REGRESSION
- C) ANOVA
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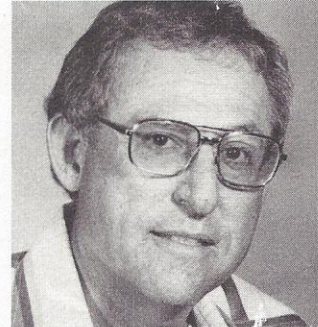


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**Irwin Hoffman uses computers
to teach English as a second
language at George
Washington High School in
Denver, Colorado.**



the student's score. A typical first-time score in the study mode is 15 to 20 percent. A second trip through the Vocabulary Prompter usually raises scores about 20 percent.

"We've found that, just about across the board, students improve their scores 20 percent after each time through the study mode," he says. "After five times, they know the list cold. When they realize Vocabulary Prompter is not a game but a challenge, the kids really learn."

Motivated to learn

After the words have been studied, the student next moves to Random Test I. This mode again lets the user choose whether the German or English word appears first. But after the student has been prompted and the translated word typed into the computer, he is not told whether his entry is correct. The program moves on to the next word in the random sequence. Once the test is completed, the student is scored as before. But if the results are less than 100 percent, he doesn't know which words he's missed.

"I've never been much of a studier," confesses Caroline. "But once you start taking the test, it's hard to stop until you get 100 percent. Especially when you think you know all the words and keep getting something like 80 percent, and you don't know which word you're missing. When that happens, I'm usually misspelling a word. That's what's good about the program. It teaches you spelling as well as vocabulary."

A third mode of Vocabulary Prompter teaches you to think in the language you're learning. Random Test II not only scrambles the word list, but switches randomly from German to English.

"When you learn a language," says Paul, "you learn English to German or vice versa. But sooner or later you're going to have to go back and forth between the two."

"That's the hard part," agrees Car-

oline. "If you give me the German word, I can tell you the English translation. But if you ask me for the German translation of an English word, it takes me a little time. Random Test II really helps me because it will go English/German, English/German, then bam. All of a sudden it will switch to German/English."

Paul and Caroline agree that the program's unique ability to scramble word sequence is the key element in using a personal computer to learn a language. As Caroline notes, in a textbook-only study situation, the student is bound by the sequential written format. "Even in the classroom," she says, "the instructor teaches the vocabulary list in alphabetical order. But when they put the words on the test, they mix up the sequence. That's what really used to mess me up."

Computer Mann

Once the language prompter with its scrambling features was perfected, Caroline began copying each week's German vocabulary list from the textbook onto the computer. The students were given a new vocabulary list on Monday, and tested on the words each Friday. Her test scores improved so dramatically, the teacher couldn't believe it.

"I told him that I was using a computer, but he didn't understand," she says. "The teacher wanted us to make flash cards from the words and turn them in each week. I got tired of cutting up the computer printouts and putting them on cards. Finally, I just started handing the teacher the paper scroll of words just as they were printed."

Today, Caroline, who has just completed her junior year at Santa Theresa High School in San Jose, takes German lessons at a private language school. Part of the course requires that she read excerpts from Thomas Mann's work in German. When she reads through the literature and stumbles over a German

word she doesn't recognize, Caroline looks up the English translation and then enters both words into a Vocabulary Prompter study list. "That's another nice thing about using this type of language program on the computer—you can create your own study lists," she says. "Some language packages only have a canned list of words. How do you know that those words in the canned program will be the ones you need to study? If they're not, you're learning a bunch of things that have nothing to do with what's going on in class."

But as versatile and as simple as Vocabulary Prompter may be, both Paul and Caroline recognize the fact that the computer can only function as a supplement for learning a language. Because the student must hear the word pronounced before he can completely learn it, there is no substitute for the language teacher. "The computer augments my language study," says Caroline. "It helps in my reading and writing of German. But it can't be a teacher, only a tool."

Unlimited potential

Professional teachers, school systems, and people like Caroline who want to learn at home are just beginning to tap what some call an unlimited potential in language education. Dr. Emily Vargus Adams, director of the Center for the Development of Non-formal Education in Austin, Texas, uses poetry and Atari 400 and 800 computers to help native Spanish-speaking children improve their English.

"The role of the personal computer in teaching language is limitless," says Adams, who works with children age two to 13. She counsels children and their parents in one-hour sessions, using the computer to enhance language development.

"The computer expands the mental opportunity of both the teacher and the student," she explains. "It can
(continued on page 107)

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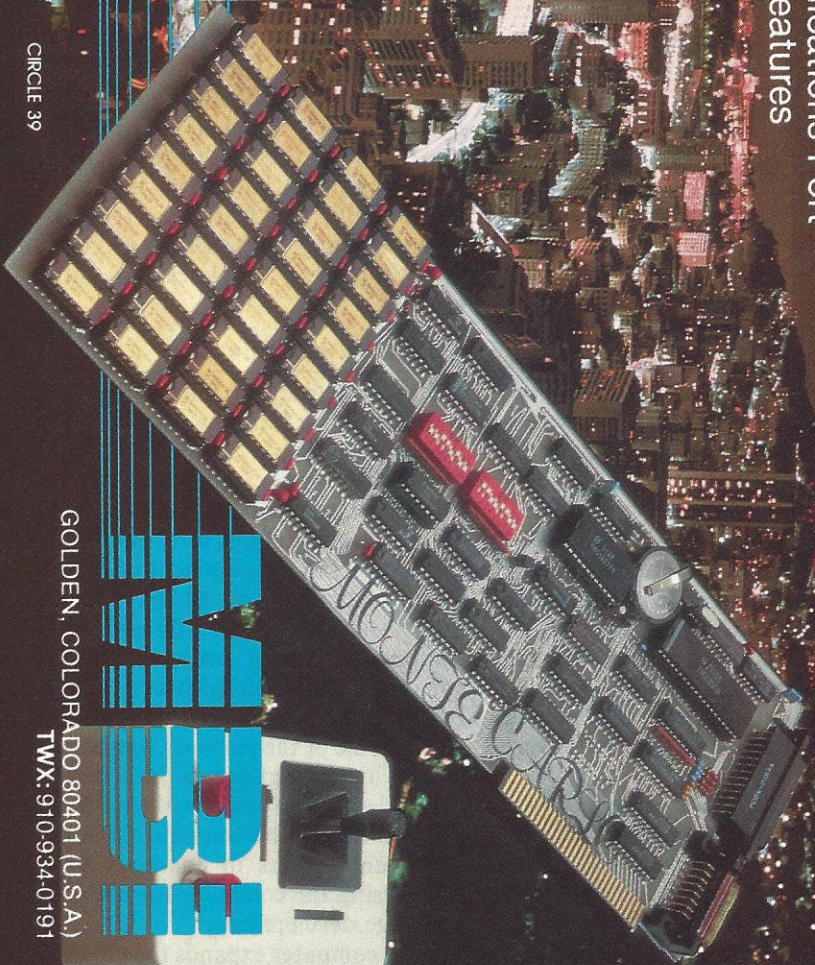
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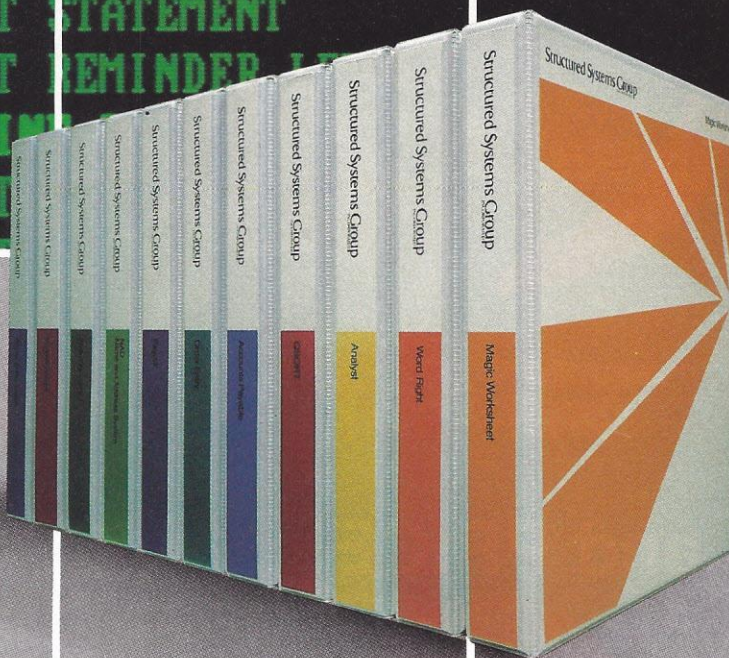
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Dr. Emily Vargus Adams,
director of the Center for
Non-formal Education in Austin,
Texas, feels the role of the
personal computer in teaching
language is limitless.



LEARNING A LANGUAGE

(continued from page 103)

motivate a person to use language as can few other approaches available. For example, take a child in the second grade, struggling with a rote-level workbook. The child is bored, stares out the window, and has a low level of concentration. But put that child in front of a computer and ask him to practice the same language skills, and you can't tear him away."

Adams cautions, however, that teachers who use personal computers to teach language should understand their limitations as well as their potential in order to gain the greatest benefits from them. "The computer does not and should not replace the teacher," she says. "The teacher must understand that the computer can't teach by itself. A child can't sit in front of the computer by himself and learn."

She says that once teachers have had the opportunity to experiment with personal computers, they realize they don't have to rely on packaged software to teach language. With software like the Atari Pilot programs, she explains, teachers can create any type of program they need. She suggests using programs that make functional use of the language, rather than ones which take a rote, workbook-type approach to study.

"First, dream a little with the child, then go to the computer," she says.

Adams has created a series of simple poems in English that the Spanish-dominant child reads on the computer. A teacher is always present, and the child is encouraged to talk about both his thoughts and what's happening on the computer screen.

After the child has read through the poem several times, key words are deleted. The child is asked to replace them by typing the appropriate word into the computer. Then, lines and verses are left out and the child is asked to replace them in the same

fashion. Finally, he is asked to write a poem of his own. The teacher helps with spelling and grammar and, most important, the right words to best express the child's thoughts.

"The computer allows the child to do things and think things he ordinarily wouldn't dare to try," Adams says. "There are infinite numbers of ways, therefore, that the teacher can promote the use of language and creative thought when she has a computer."

But Paul and Caroline point out a common problem in using a personal computer to learn a language. While Caroline can use her computer at home to help teach herself German, gaining access to computers in the school system is often difficult for language students.

"I call it the problem of eminent domain," says Paul. "The schools may have personal computers, but they are under the control of the math and science teachers, and it's difficult for others to access them."

Share the computer

One school, however, where language students have no difficulty accessing personal computers, is Denver's George Washington High School. The school has a Shared Resource Computer Laboratory equipped with 20 Atari, 10 Apple, and six Vector Graphic personal computers. Computer time is doled out on an allotment basis which gives all students an equal shot at using the computers. One third of the school's 1600 students are directly involved in computer-aided instruction.

Dr. Irwin Hoffman, chairman of the computer science laboratory at the school, says language instruction focuses on English as a second language. The school has written 40 language lessons which have been translated into Spanish, Vietnamese, Laotian and Hmong, the language of the Laotian hill people. While the lessons were designed by the teachers, all language software programs were

written by computer science students.


"The computer will never replace the teacher in language studies," says Hoffman. "But when you have a Vietnamese child who speaks no English, and no one on the staff speaks Vietnamese, the computer is the teacher."

Language lessons written at the high school use graphics to help non-English speaking students learn English. An exercise, for example, may show a picture of someone running, and ask the student to select the correct verb to describe the action depicted on the computer. If the student doesn't understand, he can hit a key to get a translation in his own language.

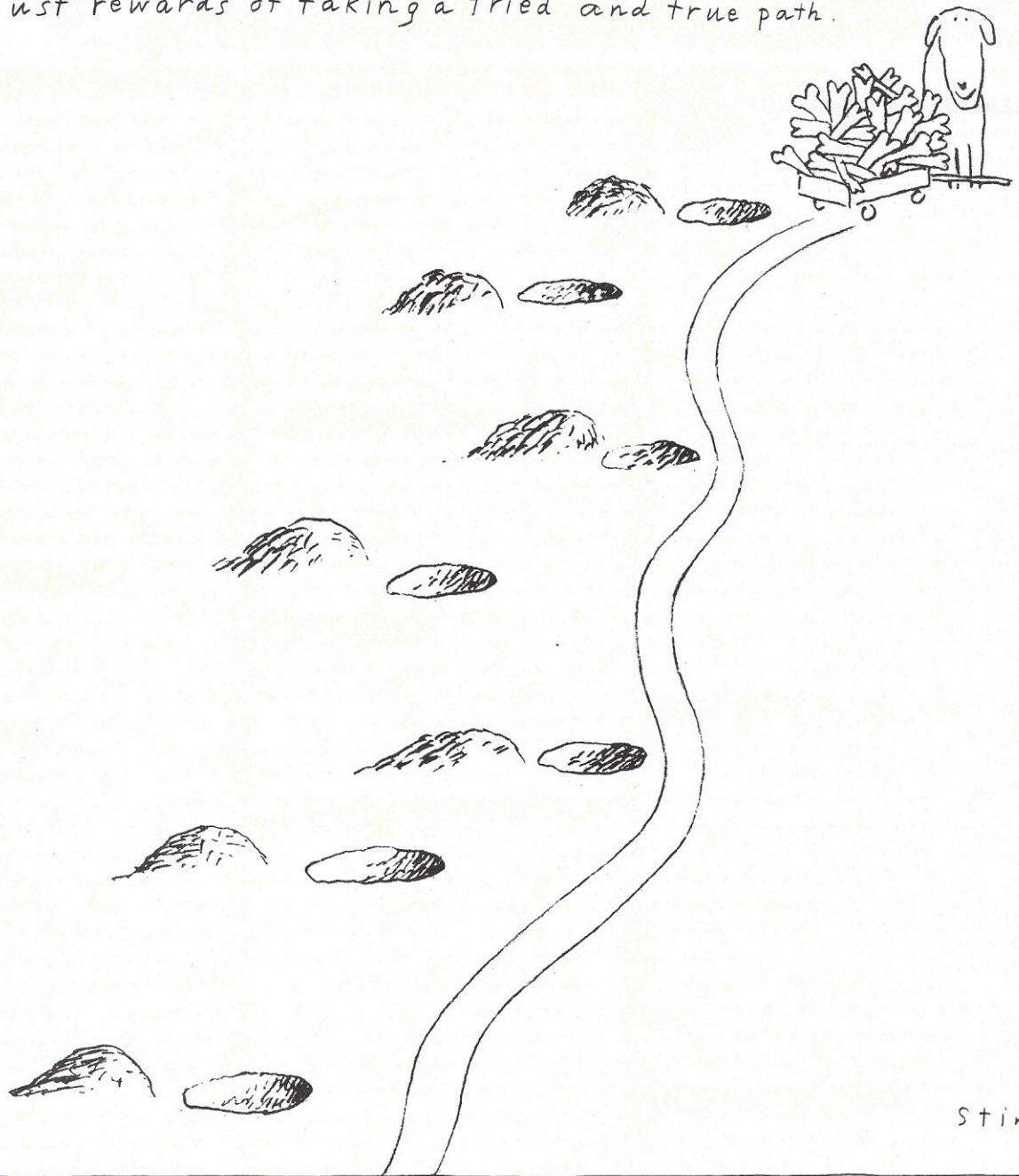
"The computer is the initial thrust when you're working with major language barrier problems," says Hoffman. "After the student has progressed to a certain level, then you need the teacher."

But Hoffman hopes one roadblock to learning a language using a personal computer will soon be overcome. Students and researchers at the school are trying to design voice synthesizers that will let students hear how words are pronounced as well as see how they're written.

For those students who can't wait for technology to catch up with their language studies, Paul and Caroline know a way to integrate the computer with the spoken word. As Paul goes through a German vocabulary test in his office, Caroline watches over his shoulder and shouts out the answers before he can respond.

"That's always the way it seems to be when you have a group of students going through the language quiz," Paul says of his daughter's verbal participation. "The teacher can pronounce the word correctly while the students watch the computer. That way, when the kids sit around and shout out the answers, everyone would learn. The personal computer is a great motivator in helping children learn a language." 

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Communicating With Presentation Graphics

Presentation graphics software offers an attractive cost-effective alternative when you need charts or graphs to communicate your data

by Paul Bonner, Associate Editor

Across the country, personal-computer users in all types of businesses are discovering a cost-effective way to enhance their presentations with high-quality graphics. They are using presentation graphics software to produce charts and graphs of a quality previously available only from a graphic artist, a dedicated graphics processor, or a data-processing department. This software provides a visual representation of relationships between data items, and it does so with substantial reductions in cost and increases in speed compared with any other method of generating these images.

The practical value of using graphics software in a business environment is now becoming evident to many people, one of whom is John Driscoll Jr., an associate with the Driscoll Agencies, an insurance and financial services company in Phoenix, Ariz. Driscoll uses the Apple Business Graphics System. "A lot of the products we market—particularly insurance—are intangible. You're talking about numbers . . . concepts. Traditionally, when a proposal is made, you're looking at a ledger with columns and numbers on it which, for a lay person, is rather confusing and difficult to understand. We use the graphics to, in effect, create a picture of that ledger. In estate planning, for instance, it's very effective to show the growth

of an estate over a period of time and a projection of estate taxes. Previously, we used only prepared slides, and I was kind of frustrated by that because it was never customized and I didn't always agree with the manner in which the slide had been designed. This system gives me the advantage of being able to personalize the graphics to a particular situation—which is, of course, much more effective. We use a Hewlett Packard 7470A plotter to draw on acetate for overhead projection, which is just a dynamite tool—it's better than slides because of its informality and the flexibility to point out things much more easily."

Analytical vs. presentation

Presentation graphics software is a subset of the broader category known as business graphics, which also includes analytical graphics software. Theoretically, analytical graphics are intended to help you analyze, for your own purposes, data which you compiled, while presentation graphics are designed to communicate a message to other individuals. The primary difference between these two methods is that analytical graphics packages, most of which are part of larger integrated packages, have generally sacrificed some flexibility or user control over the output for the sake of speed, convenience of use, and integration with other program modules. They

are, however, quite useful when you need a fast and easy way to represent data graphically and to analyze the relationships between data items. (See the analytical graphics software sidebar, page 119.)

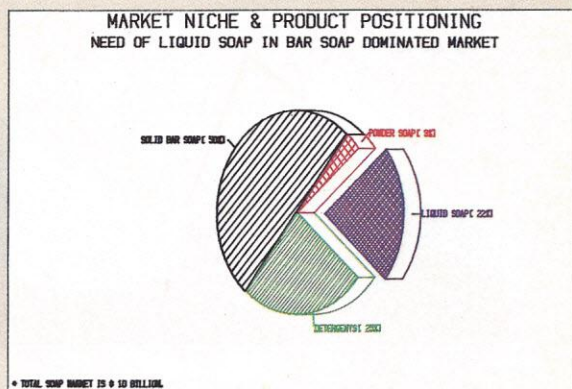
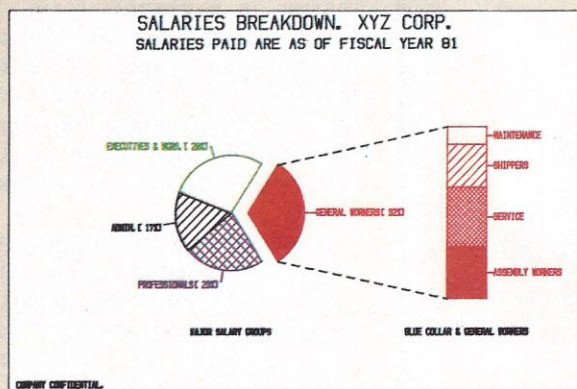
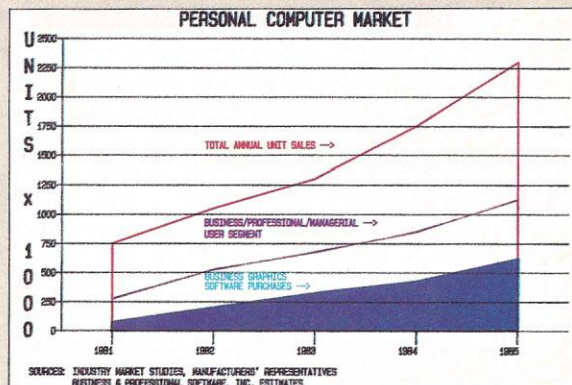
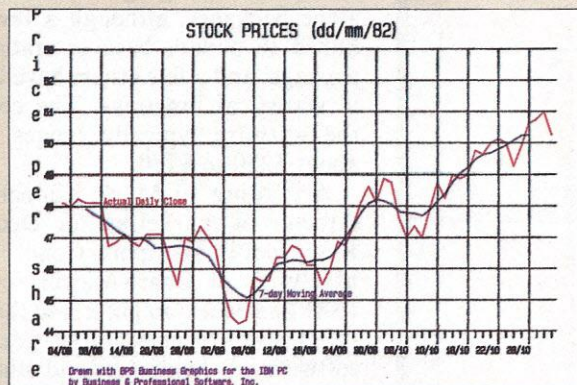
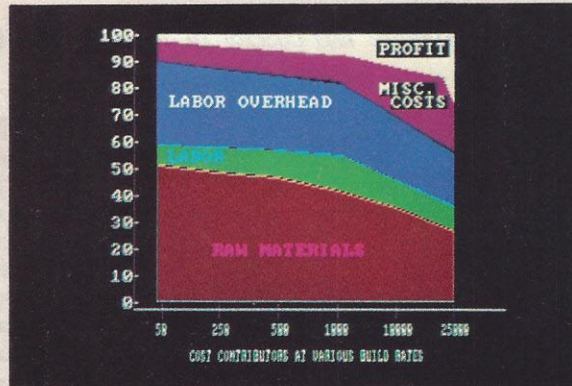
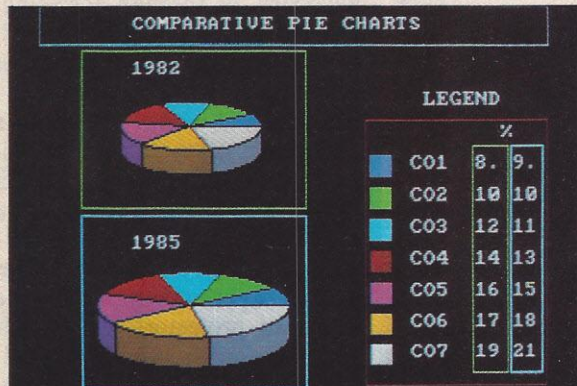
When the time comes to present your analysis to your boss, or the board of directors, or a client, you may find that analytical graphics software doesn't meet your needs. At that point, according to David Tarrant, vice president of Graphic Communications in Waltham, Mass., manufacturers of Graphwriter for the IBM Personal Computer, "I'm no longer looking to analyze the data. I'm looking to communicate a message to someone else. As soon as I move into the mode of communication rather than analysis, I have a different set of requirements. I'm getting away from a mode where I'm looking for a quick and easy way to get a chart on the screen to analyze my data, to a mode where I'm looking for something to do the job a graphics artist would do if I had one on my staff."

Fast, cheap, and easy

Presentation graphics programs are usually marketed on the premise that the wide range of options they provide in terms of chart format and layout offer a cost-effective alternative to a dedicated graphics processor or a graphic artist. The typical presenta-

Presentation graphics are intended to communicate a message to other individuals.

GRAPHIC COMMUNICATION

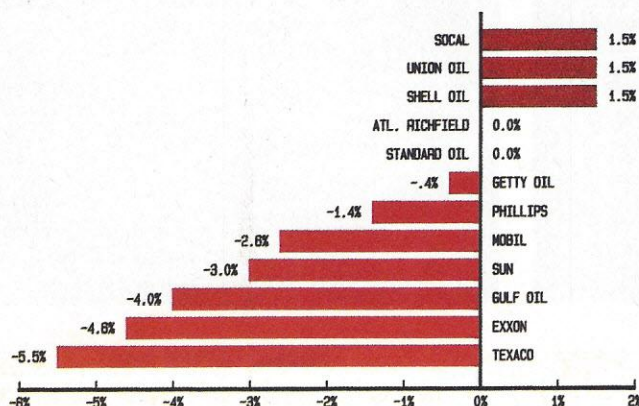


TOP ROW: Charts made with Plantronics Colorplus board for the IBM Personal Computer and (left) The Draftsman by Starware Corporation or (right) the PBC System by Ganesa Group Int'l. MIDDLE ROW: Line

charts produced with BPS Business Graphics (Business and Professional Software, Inc.). BOTTOM ROW: A pie-bar combination (left) and a three-dimensional pie chart (right) produced by Chartman (Graphic Software Inc.).

PLOTTER OUTPUT

WINNERS AND LOSERS IN THE U.S. OIL SHAKEOUT



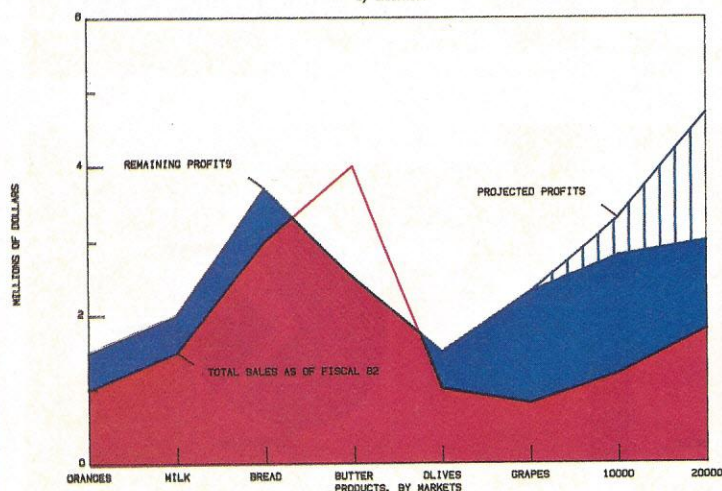
Original chart produced by
GRAPHWRITER

Annual % change in US production, 1982-85

SALES, PROFITS & PROJECTIONS

X Y Z CORP.

by CHARTMAN



TOP: Horizontal bar chart produced by Graphwriter (Graphic Communications, Inc.) with an IBM Personal Computer and a pen-plotter. **BOTTOM:** Surface-Line chart produced by Chartman (Graphic Software, Inc.).

tion-quality graphics program is a menu-driven system which will produce a wide variety of pie, line, bar, Gantt, organizational, and bubble charts. Data can be entered from the keyboard, or through accessing files created by a spreadsheet, word processor, and/or data-base manager. The output can be displayed in color or black and white on your monitor, or printed on a variety of printers (usually including the popular Epson series) and plotters (most often the Hewlett Packard 7470A). Hard-copy output can be printed or plotted either on paper or on transparencies for overhead projectors. The resolution of the output is usually limited only by the capabilities of the system hardware. Most programs are stand-alone packages, although a few are linked to a data base or statistical package, and a few others have built-in statistical functions. The cost of the software typically ranges from about \$250 to \$750.

According to Mark Koppelman, director of marketing for Decision Resources in Westport, Conn., manufacturers of Chart-Master for the IBM Personal Computer and the Apple II, users of presentation graphics software are "managers and other individuals who need to present information in a graphic form. With Chart-Master, they can do it either on hard copy (paper), or on transparencies with a pen plotter, so they have the opportunity to do overhead foils or even shoot them as 35mm slides—the output is of that high a quality."

Most users of presentation graphics packages used to get their graphs from a data-processing department or from graphic artists. Ken Phillips, vice president for telecommunications policy at Citicorp, New York City, who uses the Apple Business Graphics System, (Apple Computer Inc.) describes the advantages of doing charts and graphs himself on his Apple, rather than obtaining them from Citicorp's graphics department.

“Its ability to do real-time editing is convenient in report-writing”

“It saves a lot of money . . . Plus, it’s a hell of a lot faster, and what’s wonderful about it is that you can play around with changing scales and changing the type of graph you’re working with and the labels . . . You can type in changes and you immediately see what effect they’re going to have in the graphics sense. Its ability to do what I call real-time editing is enormously convenient and useful in report writing. The ability to switch almost instantly back and forth between different chart formats, and to see how the data falls out in the different models is a tremendous advantage.”

George Davis, division administrator of the Flight Sciences Division for Lockheed Corporation in Marietta, Ga., uses Chart-Master on an Apple II. As he points out, another advantage of these programs over a graphics department is that graphics software produces charts of consistent quality and appearance, while the appearance and quality of charts produced by graphic artists varies from chart to chart and artist to artist. And there’s the problem of getting time on the mainframe. “Our mainframes are dedicated primarily to more sophisticated assignments,” says Davis, “and all our programmers are kept busy on those. The data-processing department has been in the process of creating some chart software for some time, but it isn’t finished. We need it now, and Chart-Master does the job.” Many users cite lengthy delays in obtaining software from a data-processing department as a common reason for investing in graphics software for a personal computer.

Lee Cahill, information systems manager for International Paper Company in New York City, used to have his graphics produced by the in-house data-processing department. Now he uses Graphwriter on an IBM Personal Computer. “The advantages of doing it on a personal computer are the immediacy, the control of the

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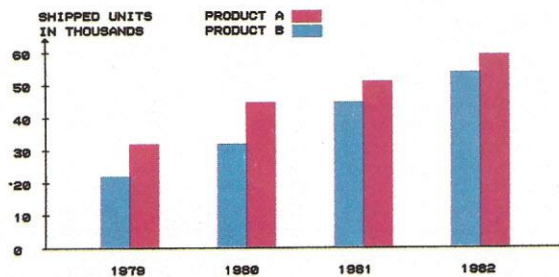
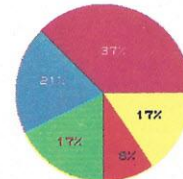
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A BUYER'S GUIDE TO BUSINESS GRAPHICS SOFTWARE

Unless otherwise specified, each of the following programs produces the standard assortment of pie, line, and bar charts, and can access data from either the keyboard or an on-disk spreadsheet or text file. (Symbols: AN-Analytical, PRST-Presentation)

APPLE COMPUTER CO.
20525 Mariani Ave.
Cupertino, CA 95014
(415) 494-2030
Business Graphics/\$175
for Apple II Plus and III
PRST

Can plot up to 3500 data points in up to six colors. Features include scatter charts, trend line analysis, curve fitting, and floating labels. Integral math and data analysis functions. Command language driven. Compatible with Pascal, Applesoft BASIC, DIF, and VisiCalc files. Alone it supports only Apple Si-lentype printer, but optional modules are available for virtually every printer and plotter.
CIRCLE 601

**BUSINESS & PROFESSIONAL
SOFTWARE INC.**
143 Binney St.
Cambridge, MA 02142
1-800-DIALBPS
BPS Business Graphics/\$350
for IBM Personal Computer
PRST

Produced by the company that wrote the Apple Business Graphics System, BPS Business Graphics can create the basic chart types and any combination of multiple bar charts, partial pies, areas, and point plots on the same axes, as well as horizontal and vertical grid lines. Integral statistical functions include moving average, exponential smoothing, and curve fitting. Instantly retrievable standard graphic report formats. Supports over 60 printers and plotters. Data entry from the keyboard or from VisiCalc or SuperCalc models, accounting reports, or word-processing documents. Menu-driven, with an English-language command structure. Screen Director/\$150-\$250
for Apple II and III
PRST

Stores and arranges images created with Apple Business Graphics System. User can enter descriptive and timing data, then

display images in the form of a slide show on a monitor screen.
CIRCLE 602

**BUSINESS PLANNING SYSTEMS
INC.**
Two North State St.
Dover, DE 19901
(302) 674-5500
Plan80/\$295
for Apple and standard CP/M computers
AN
Produces simple graphic representations of spreadsheet data.
CIRCLE 603

**CONTEXT MANAGEMENT
SYSTEMS**
23864 Hawthorne Blvd.
Suite 101
Torrance, CA 90505
(213) 378-8277
MBA/\$695
for IBM Personal Computer
AN
Combines basic graphing functions with a spreadsheet, word processing, data management, and communications in an integrated software package.
CIRCLE 604

CREATIVE SOFTWARE CONCEPTS
P.O. Box 349
Binghamton, NY 13902
(607) 729-5558
Superscreen/\$500
for Z80-based systems
AN
Combines basic graphing functions with a word processor, data file manager, and spreadsheet in an integrated software package.
CIRCLE 605

DECISION RESOURCES
21 Bridge St.
Westport, CT 06880
(203) 222-1974
Chart-Master/\$375
for Apple II, Apple III, IBM Personal Computer
PRST
Menu-driven program that produces up to nine charts per page, including all three standard varieties and scatter charts. Features include on-screen preview of chart prior to plotting (IBM version only). Supports Hewlett-Packard 7000 series and 9872 plotters. Can be used to produce transparencies for overhead projection.
CIRCLE 606

DESKTOP COMPUTER SOFTWARE
303 Potrero St.
Santa Cruz, CA 95060
(408) 458-9095
Graph 'n' Calc/\$195
for IBM Personal Computer
AN
A menu-driven integrated statistical/financial package with graphics functions that can be used to create standard chart types, stock market charts, and computer slide shows. Interfaces with Epson printers equipped with the Grafrax option or with a Hewlett-Packard two-pen color graphics plotter.
CIRCLE 607

DICKENS DATA SYSTEMS
3050 Holcomb Bridge Rd.
Norcross, GA 30071
(800) 241-6753
The Wall Street Plotter/\$125
for Apple Computers
AN
A graphics software package designed to aid in the analysis of financial securities, commodities, and market averages. Produces standard-price plots including moving average, "high-low-close-volume" plots, and trend-analysis plots of the trading cycle.
CIRCLE 608

EAGLE SOFTWARE
110 West Lancaster Ave.
Wayne, PA 19087
(215) 964-8600
Money Decisions/\$229
for IBM Personal Computer
AN
A collection of 36 business and financial problem-solving routines, many of which are supported with integrated graphics. Tax Decisions/\$229
for IBM Personal Computer
AN
Designed to aid tax professionals in formulating effective tax plans, this program displays key lines of Form 1040 in both graph and report formats, illustrating the user's liability calculated either for a single plan or as a comparison of all available plans.
CIRCLE 609

FEROX MICROSYSTEMS INC.
1701 N. Fort Myer Drive
Arlington, VA 22209
(703) 841-0800
GraphPower/\$295

for Apple II, Apple III, IBM Personal Computer
PRST
A menu-driven program that will create up to four stacked bar, text, and financial report charts per page, as well as the standard chart types. Features include three types of shading, 100 shading densities, solid, dashed, or dotted lines, a wide variety of type fonts for labeling charts, and extensive options for scaling, corner points, and other parameters. Integral calculator functions. Accepts data from keyboard, Pascal files, or Micro-DSS/Finance modeling files. Charts and data may be transmitted to other computers via Ferox's LogOn communications package.
CIRCLE 610

**GRAPHIC COMMUNICATIONS
INC.**
200 Fifth Avenue
Waltham, MA 02254
(617) 890-8778
Graphwriter/\$395
with Extension Set/\$795
for IBM Personal Computer
PRST
A menu-driven program that will produce all the basic chart types, plus Gantt, organizational, range, scatter, bubble, surface, overlay, tabular, and combination charts. (Some of these are available only with the Extension Set.) Over 40 preset but modifiable graph formats are provided with the program, as well as the capability to produce any format desired. Supports a wide range of plotters.
CIRCLE 611

GRAPHIC SOFTWARE INC.
P.O. Box 367, Kenmore Station
Boston, MA 02215
(617) 491-2434
Chartman/\$380
for IBM Personal Computer
PRST
A menu-driven package that offers 25 types of charts in a variety of colors, textures, and shades, and both two- and three-dimensional graphs. Other features include on-screen preview of the graph prior to printing, and a slide presentation feature that allows you to save a series of graphs on disk and then display them in a demonstration. Interfaces with mono-

*These packages encourage you
to experiment with formats
and foster a rapid learning curve.*

chrome graphics and color RGB monitors, Hewlett-Packard models 210, 7470, 810, and 7220 plotters; and IBM models 749 and 750 plotters, IBM graphics printer, Epson printers equipped with the Grafrax ROM, and color IDS Prism printers.
CIRCLE 612

HEWLETT-PACKARD CO.
1000 Circle Blvd., NE
Corvallis, OR 97330
(503) 757-2000
Graphics Presentation Pac/\$250
for HP-87, HP-86, and other HP Series 80 personal computers
PRST

Presentation-quality graphics can be output from this menu-driven program to either the screen or a color plotter for paper hard copy or transparencies. Produces standard graphs, plus arc and tangent drawings.
CIRCLE 613

LIFEBOAT ASSOCIATES
1651 Third Avenue
New York, NY 10028
(212) 860-0300
Graftalk/\$450
for CP/M based computers
PRST

English-language commands are used to create line, point, symbol, bar, and exploded-pie charts. Data input from financial modeling and other disk files. Features include on-screen editing and windows on the plotting surface.
CIRCLE 614

LOTUS DEVELOPMENT CO.
55 Wheeler St.
Cambridge, MA 02138
(617) 492-7171
1-2-3/\$495
for IBM Personal Computer
AN

An integrated package incorporating a spreadsheet, data-base management functions, and graphics. Can produce standard chart types in black-and-white or color on the screen, printer, or plotter.
CIRCLE 615

NORPAK LTD.
10 Hearst Way
Kanata, Ontario
Canada K2L 2P4
(613) 592-4164
TelCalc II/\$195

for CP/M based computers
PRST

A color graphics system that inputs data from VisiCalc files to automatically draw color graphs and charts. Chart types include stacked histograms, clustered bars, multiple lines, and single and multiple pies with exploded slices. Features include slide-show presentation capability, and simple editing of title, background, and window colors. Requires Norpak MK4 Telidon Videotex Decoder to generate the graphics.
CIRCLE 616

PEACHTREE SOFTWARE INC.
3 Corporate Square #700
Atlanta, GA 30329
(404) 325-8533
PGL/\$600
for IBM Personal Computer,
CP/M based computers
PRST
Features on-screen editing of standard charts in black-and-white or color. Templates of some chart types included. Interfaces with PeachCalc spreadsheet program.
CIRCLE 617

PRIMESoft CORP.
P.O. Box 40
Cabin John, MD 20818
(301) 229-4229
The Prime Plotter/\$239.95
PRST

A modular, multipurpose graphics, data management, and statistics package. Produces a full range of standard chart types and x-y charts in over 100 colors. Features include graphics utilities and slide-show capability.
CIRCLE 618

RADIO SHACK—TANDY CORP.
One Tandy Center
Fort Worth, TX 76102
Available at local Radio Shack stores
Business Graphics Analysis
Pak/\$174.95
for TRS-80 Model III
PRST

Produces standard chart types in a variety of sizes. Inputs data from keyboard or disk files. Features on-screen editing, scale range adjusting, and shading. Interfaces with Radio Shack printer or multi-pen plotter.

SOFTWARE PUBLISHING CORP.
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910
PFS:Graph/\$125-\$175
for Apple II, III
AN
Interfaces with PFS:File or VisiCalc to produce a full set of standard bar types. Up to four graphs may be displayed on a single set of axes. Features automatic formatting, scaling, legend labeling, and pattern fill.
CIRCLE 619

SORCIM CORPORATION
2310 Lundy Avenue
San Jose, CA 95131
(408) 942-1727
Superchart/\$195
for CP/M based systems
PRST

A menu-driven program that produces the standard chart types in either black-and-white or color, and accepts data from SuperCalc files. Features highly-flexible chart layout, on-line help menus, multiple character fonts, full control of axes, user-specified plot windows, and automatic scaling, formatting, and pattern fill. Output to screen or to color and monochrome printers.
CIRCLE 620

STARWARE CORPORATION
1701 K St., NW
Washington, DC 20006
(202) 331-8833
The Draftsman/\$200
for IBM Personal Computer
PRST

A menu-driven program that produces a full range of standard charts, scatter charts, and multiple charts on one page. Features on-screen editing, on-line help menus, and a disk-based user manual. Supports Epson and IDS Prism printers.
CIRCLE 621

STROBE INC.
897-5A Independence Avenue
Mountain View, CA 94043
(415) 969-5130
Enhanced Business Graphics
Package/\$195
for IBM Personal Computer or MS-DOS-or CP/M-based systems
PRST
Using data entered from the keyboard, VisiCalc, or SuperCalc, this program can produce a full range of standard chart

types in black-and-white or color. Up to four charts can be printed on one page, and bar charts may contain up to 48 bars. The software will automatically proportion up to 15 pie chart segments.
CIRCLE 622

VECTOR GRAPHICS INC.
500 N. Ventu Park Rd.
Thousand Oaks, CA 91320
(800) 235-3547
AccuChart/\$295
for Vector Graphic personal computers
PRST

This menu-driven program produces six types of graphs in three different sizes. Accepts data from other application programs and disk files. Interfaces with Vector Graphic 7700 printer or Diablo protocol word-processing printers.
CIRCLE 623

VISICORP
2895 Zanker Rd.
San Jose, CA 95134
Desktop Plan II/\$250
for Apple II
AN
Advanced financial/spreadsheet package with integral graphics functions. VisiTrend/Plot/\$300
for Apple II, Apple III, and IBM Personal Computer
AN
Interfaces with the other Visi-Series software packages to produce standard chart types. Features integral statistics functions.
CIRCLE 624

WADSWORTH ELECTRONIC PUBLISHING CO.
Statler Office Building
20 Park Plaza
Boston, MA 02116
(800) 322-2208
Statpro/\$1995
PRST
This is a statistics and graphics data-base workstation supplied on 26 disks. The extensive graphics functions are fully integrated with the statistical and data-base features. Graph formats available include scatter, triangle regression, and box plots, pie charts, histograms, and dendograms.
CIRCLE 625

data, the ability to look at the screen and play the what-if game before I print it—and the ability to change it quickly to produce a final product,” he says. “Second, the quality of the output is what we call ‘board-room-quality presentation,’ as opposed to a computer printout with dot-matrix characters.”

Another user who praises the speed and quality of charts produced by her personal computer is Valerie Crane, president of Research Communications, Inc., a Boston-based research firm which tests audience responses to new television shows. Crane uses the Apple Business Graphics System, which allows the user to create “take” files—a standard graph template into which data can be entered very quickly. “The biggest problem that we face as a client-centered research company is the quick turnaround needed to provide feedback,” says Crane. “We usually have only two to three days to report to our client. To facilitate this process, we use the ‘take’ files . . . to enter the data and format graphs automatically. This whole process takes only two or three hours to enter data for about 30 graphs.”

Comparative costs

The cost advantages of presentation graphics software are as impressive as the speed and versatility of the programs. A typical system, including a personal computer, printer or plotter, and software, can be obtained for \$5000 or less, and once it is installed, graphs and charts can be produced quickly and with little expense. In contrast, free-lance graphic artists typically charge \$10 to \$20 per hour to produce business graphics, while graphics houses will charge about \$20 for a black-and-white 8½-inch by 11-inch chart, and \$50 to \$75 for a color chart. Custom slides can range from \$10 to \$100 apiece. Time-sharing data-processing companies charge from \$25 to \$50 for charts and graphs, with substantial surcharges

for fast turnaround service (up to a 100 percent surcharge for less than a 24-hour turnaround).

Ken Phillips believes that direct cost comparisons are “like comparing apples and oranges. The graphics department comes up with crisp, clear, 35mm slides of publishable quality that you can send out for four-color separation,” he says. “You can’t do that with the stuff that comes out of the Apple Business Graphics package. But on the other hand, you don’t typically need that level of output for internal presentations.”

The resolution of graphs produced by a presentation graphics program is usually limited by the system hardware, but there are hardware peripherals designed to overcome some of those limitations. One is the ColorPlus graphics adaptor for the IBM Personal Computer (Plantronics, Frederick, MD.), which increases the number of colors that can be displayed in the medium resolution mode on the IBM Personal Computer from four to 16, and allows four colors to be displayed in the high-resolution mode. The ColorPlus system includes a presentation-quality software package called The Draftsman.

For those who want to create 35mm color slides with their personal computer, Polaroid has just announced a new interactive hard-copy system that will work with the IBM Personal Computer, the Apple II, and the Apple III. The system will produce 35mm slides and conventional films, with enhanced resolution and a 72-color palette, and is expected to sell for about \$1000. Polaroid estimates that, when used with their new instant-developing 35mm film, the system will produce color slides for about 45 cents each.

Even without the Polaroid system, most presentation packages can produce a “slide show” on your monitor screen. Dikran Bezjian, president of Graphic Software Inc. (Boston, Mass.), manufacturers of Chartman for the IBM Personal Computer, de-

scribes one use of this capability: “Some users of Chartman are creating charts and saving them as a slide show, and then sending a single diskette of slides up to an executive at a distant location who then runs through the slide show of charts on his own personal computer. People don’t waste time plotting, printing, or shuffling papers around, they just send the graphs out on a disk and the next week send another disk with updated charts. Bezjian also says his firm is working on a communications interface which will allow the computer generated “slides” to be transmitted to and displayed on a distant monitor via a modem link.

Harry Loats, president of Loats Associates of Westminster, Md., a field biology research firm that uses an IBM Personal Computer equipped with the Plantronics ColorPlus board, pointed out further advantages provided by the low cost of a graphics system on a personal computer. “You can have dedicated units. In addition, since it’s low cost it can go out into the field. Our system, with about \$5000 of hardware, is doing the job that traditionally a \$60,000 to \$100,000 system would do. This is replacing extremely large computer systems which couldn’t go out into the field.”

Friendly and outgoing

Of course, a graphics system, no matter how high its quality and how low its cost, is of no value to the average individual unless it is easy to use. Few executives have the time or inclination to study graphic design in order to save a few dollars. Dikran Bezjian explains the need for easy-to-use programs, “Business graphics are not used by a programmer; they are used for management purposes by business executives—people who, in general, don’t know programming or have much computer expertise. And because of that, for any computer graphics program to be successful, it has to be very user friendly.”

*The Polaroid system will produce
35mm slides from a computer display
for about 45 cents a slide.*

A BUYER'S GUIDE TO BUSINESS GRAPHICS HARDWARE

(Symbols: DM-Dot matrix printer with graphics capability, PL-pen plotter, FC-Four color printer, LJ-Color Ink Jet Printer, IB-Printer Interface Board with graphics options)

ALPHA MERICS
20931 Nordhoff St.
Chatsworth, CA 91311
(213) 709-1155
Alphaplot/PL/\$5000 up
Datascrite/PL/\$9900
for most personal computers
CIRCLE 291

AMDEK
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 364-1180
Amplot II/six color PL/\$1290
DXY-100 Digital Plotter/\$749
for most personal computers
CIRCLE 292

ANADIX
9825 DeSoto Ave.
Chatsworth, CA 91311
(213) 998-8010
DP 9000/DM/\$1550
DP 9500/DM/\$1650
for most personal computers
CIRCLE 293

ANALOG DEVICES
P.O. Box 280
Norwood, MA 02048
Micromac-4000/IB/\$1290-\$2070
for most personal computers
CIRCLE 294

APPLE COMPUTER CO.
20525 Mariani Ave.
Cupertino, CA 95014
(415) 494-2030
Apple Dot Matrix Printer/
DM/\$695
for Apple II and III
CIRCLE 295

AXIOM CORP.
5932 San Fernando Rd.
Glendale, CA 91202
(213) 245-9244
GP-80M/DM/\$399
EX-850/DM/\$1595
IMP-1/DM/\$699
for most personal computers
CIRCLE 296

BAUSCH & LOMB
P.O. Box 15720
Austin, TX 78761
(512) 835-0900
CPS-10/PL/\$9990
for most personal computers
CIRCLE 297

CENTRONICS DATA COMPUTER CORP.
One Wall St.
Hudson, NH 03051
(603) 883-0111
122/Graphics Printer/\$995
353/DM/\$2495
for all personal computers
CIRCLE 298

C. ITOH
5301 Beethoven St.
Los Angeles, CA 90066
(213) 306-6700
CI-3000/DM/\$4500
CI-6000/DM/\$5700
Prowriter 8510/DM/\$495
Prowriter 1550/DM/\$995
for most personal computers
CIRCLE 299

DATASOUTH
4216 Stuart Andrew Blvd.
Charlotte, NC 28210
(704) 523-8500
DS 108/DM/\$1595
for most personal computers
CIRCLE 540

DIABLO SYSTEMS
26460 Corporation Ave.
Hayward, CA 94545
(415) 786-5200
Series C/LJ/\$1250
Series 11/DM/\$649
Series 31/DM/\$950
Series 32/DM/\$1394-\$1495
Series 38/DM/\$2195
Series 200 EPM/Thermal Transfer
Printer/\$4995
CIRCLE 541

DIGITAL EQUIPMENT CORP.
200 Baker Ave.
Concord, MA 01742
(800) DIGITAL
Letterprinter 100/DM/\$2690
for most personal computers
CIRCLE 542

ENVISION CORP.
631 River Oaks Pkwy.
San Jose, CA 95134
(408) 946-9755
420 Color Printer/\$3950
CIRCLE 543

EPSON AMERICA
3415 Kashiwa St.
Torrance, CA 90505
(213) 539-9140
FX-80/DM/\$699
MX-100/DM/\$895
for most personal computers
CIRCLE 544

FACIT INC.
66 Field Point Rd.
Greenwich, CT 06836
(203) 622-9150
Dataroyal 4510/DM/\$695
for most personal computers
CIRCLE 545

HEWLETT-PACKARD CO.
(see software guide)
7470/PL/\$1575
for Apple II, IBM Personal Computer,
and H-P computers
CIRCLE 546

HOUSTON INSTRUMENTS
P.O. Box 15720
Austin, TX 78761
(512) 835-0900
Hiplot DMP-29/DM/\$1995
for all personal computers
CIRCLE 547

INTEGRAL DATA SYSTEMS
Route 13 S.
Milford, NH 03055
(603) 673-9100
Prism 80 Color Printer/\$1299
Prism 132 Color Printer/\$1499
for all personal computers
CIRCLE 549

INTERACTIVE MICROWARE
P.O. Box 77
State College, PA 16801
(814) 238-8294
Adalab/IB/\$495 (includes software)
for Apple II
CIRCLE 550

INTERACTIVE STRUCTURES INC.
P.O. Box 404
Bala Cynwyd, PA 19004
(215) 667-1713
PKASO/IB/\$175
for Apple Computers
CIRCLE 551

MANNESMAN TALLY
8301 S. 180th St.
Kent, WA 98032
(206) 251-5524
MT 160/DM/\$845-\$990
for all personal computers
CIRCLE 552

MICRO PERIPHERALS INC.
4426 S. Century Dr.
Salt Lake City, UT 84107
(800) 821-8848
Printmate 150/DM/\$995-1345
for all personal computers
CIRCLE 553

OKIDATA CORP.
111 Gaither Dr.
Mt. Laurel, NJ 08054
(800) OKI-DATA
Microline Series
Printers/DM/\$399-\$1495
for most personal computers
CIRCLE 554

ORANGE MICRO INC.
3150 La Palma
Anaheim, CA 92806
(714) 630-3620
Grappler +/IB/\$175
for Apple II, Apple III, and IBM Personal
Computer
CIRCLE 555

**PLANTRONICS/FREDERICK
ELECTRONICS**
7630 Hayward Rd.
P.O. Box 502
Frederick, MD 21701
(301) 662-5927
COLORPLUS Color Enhancer Board (in-
cludes The Draftsman software
package from Starware)/\$475
for IBM Personal Computer
CIRCLE 556

PRINTACOLOR CORP.
5965 Peachtree Corners East
Norcross, GA 30071
(404) 448-2675
PG-1000/LJ/\$4995
for Apple II, Apple III, IBM Personal
Computer
CIRCLE 557

QANTEX DIV. of NORTH ATLANTIC
90 Plant Ave.
Hauppauge, NY 11787
(516) 582-6060
6000/DM/\$1195
7030/DM/\$1995
for all personal computers
CIRCLE 558

QUME CORP.
2350 Qume Dr.
San Jose, CA 95131
(408) 942-4000
Sprint 11 Plus daisy wheel
printer/\$1776
for all personal computers
CIRCLE 559

RADIO SHACK—TANDY CORP.
(see software guide)
TRS-80 Color Graphic
Printer/Plotter/\$249.95
TRS-80 DMP 100/DM/\$399
TRS-80 DMP 200/DM/\$799
TRS-80 DMP 400/DM/\$1195
TRS-80 DMP 500/DM/\$1795
TRS-80 Multipin/PL/\$1995
for all personal computers
available at local Radio Shack stores

SOLTEC CORP.
11684 Pendleton St.
Sun Valley, CA 91352
(800) 423-2344
Model 6801 (DIN A4)/PL/\$1995
Model 6802 (DIN A3)/PL/\$2495
Model PL 1000 (DIN A4)/PL/\$995
Model PL 2000 (DIN A4)/PL/\$2295
CIRCLE 560

STAR MICRONICS
1120 Empire Central Pl.
Dallas, TX 75247
(800) 631-8560
Gemini 10/DM/\$499
Gemini 15/DM/\$649
for all personal computers
CIRCLE 561

STROBE INC.
897-5A Independence Ave.
Mountain View, CA 94043
(415) 969-5130
Graphics Plotter/\$785
for most personal computers
CIRCLE 562

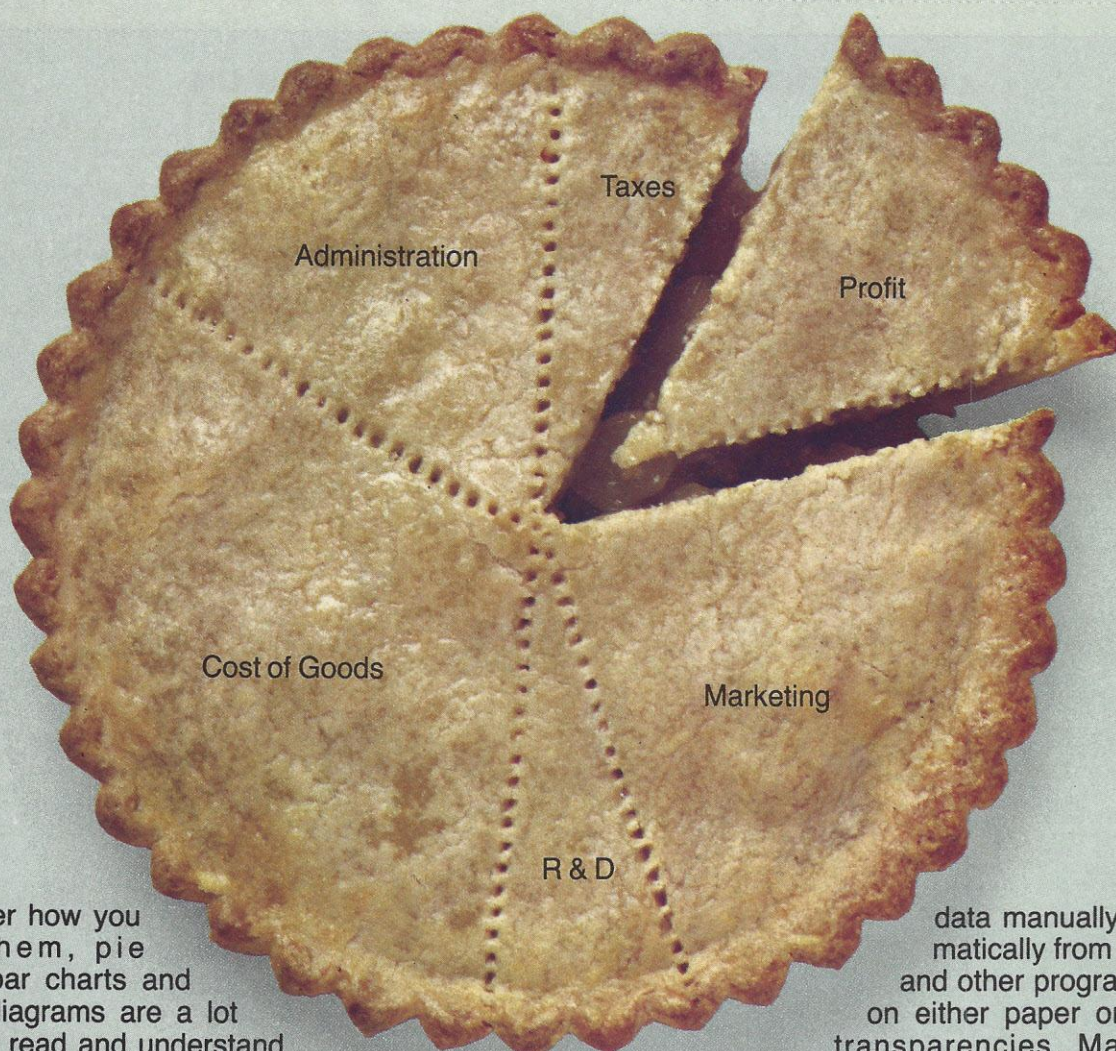
TRANSTAR
Box C-96975
Bellevue, WA 98009
(206) 454-9250
315/FC/\$599
for Apple II and IBM Personal
Computer
CIRCLE 563

TRILOG INC.
17391 Murphy Ave.
Irvine, CA 92714
(714) 549-4079
Colorplot 60/DM/\$11500
Colorplot 100/DM/\$11500
Colorplot 144/DM/\$11500
T 100/PL/\$8200
T 1100 A/PL/\$9050
TIP 150/PL/\$3900
TIP 300/PL/\$4900
CIRCLE 564

VECTRIX CORP.
700 Battleground Ave.
Greensboro, NC 27401
(919) 272-3479
VXP/DM/\$1495
CIRCLE 565

**YOKOGAWA CORPORATION
OF AMERICA**
2 Dart Rd.
Shenandoah, GA 30265
(404) 253-7000
PL-1000/PL/\$1200
PL-2000/PL/\$2000
Graphmate/PL/\$2800
for most personal computers
CIRCLE 566

With Chart-Master,TM creating quality graphics is as easy as apple pie.



No matter how you slice them, pie charts, bar charts and scatter diagrams are a lot easier to read and understand than rows and columns of numbers.

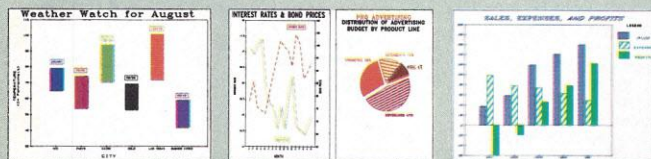
Now you can create colorful business graphics anytime you need them, with an easy-to-use Chart-Master graphics software program. A program that works with Hewlett-Packard, Panasonic and other plotters and your IBM® personal computer.

data manually or automatically from Visicalc® and other programs. Print on either paper or acetate transparencies. Make your charts any size, anywhere on the page.

Have your text appear in attractive print-quality type. Choose from sophisticated formats that include percentage bars, stock price (High/Low/Close) and area charts.

Power and ease-of-use. That's why Chart-Master is in daily use at major corporations like GE, Eastman Kodak, Exxon, Union Carbide, GM, AT&T, DuPont, 3M, Citibank, Motorola, Proctor & Gamble and GTE.

The retail price of Chart-Master is \$375. For a complete information kit and name of your nearest dealer, contact Decision Resources, Inc., 21 Bridge Square, Westport, CT 06880. (203) 222-1974.



Values printed at data points; both left and right Y-axis scales; floating legends & bars; both horizontal & vertical formats; exploded pie sections.

Just enter your data, choose a chart format, preview the chart on your screen, and Chart-Master will automatically create a beautiful, presentation-quality chart. In seconds.

There's more to Chart-Master than simplicity. Incredible power and sophistication. You can enter

DecisionResources
Software Designed for Decision Makers

Visicalc is a trademark of Visicorp.
IBM is a trademark of International Business Machines Corporation.

CIRCLE 44

“The acid test for business graphics is whether the display communicates any information.”

**PROFESSIONAL/
MANAGERIAL**

According to the users we've talked with, most manufacturers have been successful at meeting that goal. Ken Phillips says the Apple Business Graphics System "is wonderful because you can take inexperienced people who have no background in either graphics or software, and in a matter of a couple of hours get them running it and producing quite sophisticated graphics." Peter Crowell, director of communications services for CBS television stations in New York City, says almost the same thing about Graphwriter: "That's what sold me on it in the first place. You give an analyst the product and within a half-hour they're drawing very high quality graphs, and within a few days they're probably doing customized stuff."

How friendly is friendly?

There are some critics who feel that the currently available presentation-graphics systems still fall short when it comes to "user friendliness." John Durrett, president of Interactive Systems Laboratories, a human factors consulting group in San Marcos, Texas, believes that the software now on the market gives users the capability of making effective graphs, but not the knowledge of how to do so. "The acid test for graphics is not whether you can, in fact, do it on a computer display, but whether the results of the computer display communicates any information... You cannot replace a graphic artist with just this hodgepodge of hardware and color output. Instead, we should build into our graphic software the intelligence necessary to produce a graph that people will understand and that will communicate information—the knowledge that a graphic artist has."

In a paper to be presented at the National Computer Graphics Association meeting June 27-30, 1983, Durrett emphasizes eight factors which both manufacturers and users must consider in order to get effective

(continued on page 174)

ANALYTICAL GRAPHICS SOFTWARE

Analytical graphics software is primarily designed to provide a fast means for the individual user to analyze the data he has compiled. Although the output of most analytical graphics packages is limited when compared to presentation-quality software, an analytical graphics package can be very useful. This is particularly so when you are working with complex data structures, where a visual representation of your data will often help you see relationships that are not clear when you examine the data in tabular form.

Convenience and speed are of major importance in an analytical graphics program. It must be able to access data stored in disk files (especially spreadsheet files), and quickly send the data in graphic form to your monitor or printer. User control over the aesthetic details of the graph is not as important as the speed and ease with which the program produces the graph.

Most of the more popular analytical graphics programs are part of integrated software packages which utilize common data files and, in some cases, allow you to switch from your spreadsheet or data-base program to the graphics program and back again without changing disks. These include PFS:Graph (Software Publishing Corp., Mountain View, Calif.), Visi Trend/Plot (VisiCorp, San Jose, Calif.), and the graphics portions of Lotus 1-2-3 (Lotus Development Corp., Cambridge, Mass.) and the Valdocs System on the QX-10 (Epson America, Inc., Torrance, Calif.).

PFS:Graph (for the Apple II, Apple III, or IBM Personal Computer) can create graphs or charts using data which is either entered directly from the keyboard, or stored in files created by PFS:File, the forthcoming PFS:Write, or VisiCalc. PFS:Graph can create up to four pie, bar, or line charts on a single set of axes. Features such as formatting, scaling, legend labeling, and pattern fill are automatic, making the program simple to use.

The VisiPlot portion of Visi-Trend/Plot (for the Apple II, Apple III, or IBM Personal Computer) has capabilities very similar to those of PFS:Graph. It can access data stored in files created by other components of the VisiSeries, and the forthcoming VisiOn system will apparently allow co-resident operation of the graphics package with other VisiCorp products, at least for the IBM Personal Computer. The VisiTrend portion of the package provides advanced statistical analysis formulas.

Lotus 1-2-3 is an integrated software package for the IBM Personal Computer that combines spreadsheet functions, graphing, and data-base management. The advantage of an integrated package is that all functions are available to the user through a few keystrokes. No disk swapping or rebooting is necessary to go from the graphics portion to the other functions, and the contents of memory are not lost when you switch from one function to another. The graphics portion of Lotus 1-2-3 will produce the full standard repertoire of chart types on the screen in either black-and-white or color, and is designed to interface with and utilize the full capabilities of a wide range of printers and plotters.

Valdocs is an integrated hardware/software system currently available only on the Epson QX-10 computer. The system includes integral word processing, and calculator, schedule, and graphics functions. Valdocs is booted automatically when you turn on the power, and all four functions are available instantly with no loss of data held in memory when you switch from one function to another.

Many users will find that, despite inherent limitations, analytical graphics packages provide all the graphics capability they need to analyze data and to report their findings. If that is the case, then the ease-of-use and speed of these packages make them very attractive alternatives to presentation graphics packages.

Data Bases To Guide The Traveling Gourmet

Computerized restaurant guides help you dine well
when you're on the road

by Marvin Grosswirth

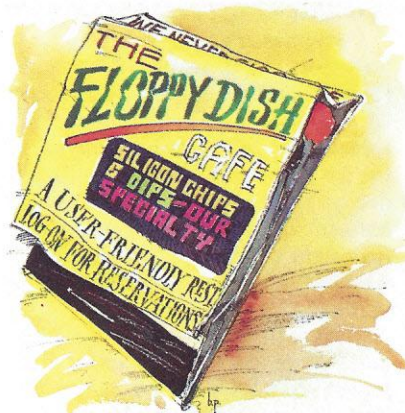
Among the pleasures and profits of personal computing is the knowledge that people who travel on business need no longer abuse their already brutalized digestive systems with guesswork dining. Now the computer can help find the right places to eat. But it wasn't always this way.

Picture it: The Commercial Traveler (hereafter known as CT to avoid sexist pronouns) sits on a polyester bedspread in a formica-and-plastic hotel room, wondering where to have dinner. Strewn about are several small, poorly printed publications with names like *What's On in Wembley* and *Today in Tarryville*. Said publications are opened to restaurant listings, a few of which have been circled by CT in the hope of selecting a place where the food is decent, the prices within reach, and the service hospitable to a lone diner.

CT is distressed. He knows the listings have been paid for—and written by—the very establishments whose virtues they extol and are, therefore, about as reliable as *Pravda*. Finally, CT makes a decision, picks up the telephone, dials room service, and orders a steak and salad—again. Fade out.

Fade in. CT is seated in an elegant dining emporium. Real linen. Silver-

Marvin Grosswirth is a New York-based free-lance writer who specializes in computers.



Illustrations by Bill Prochnow

ware from Sheffield, instead of Taiwan. Impeccable service. Exquisite food. Ambrosial wine. Prices that could finance a moon launch. Across the table sits CT's prospective client, who, although unlikely to consummate a business deal at this time, is nevertheless enjoying himself immensely. And why not? After all, he selected the restaurant, at CT's request.

Again, CT is distressed. He knows The Boss will never understand how it is possible to use up four months' expense allowance at a single dinner. Neither, probably, will the IRS.

Of course, not all business travelers participate in such distressful scenarios. After a while, some develop a sense of selection, a list of favorite spots, and certain tastes. Sometimes, they just get lucky. And more often these days, they get a little help from

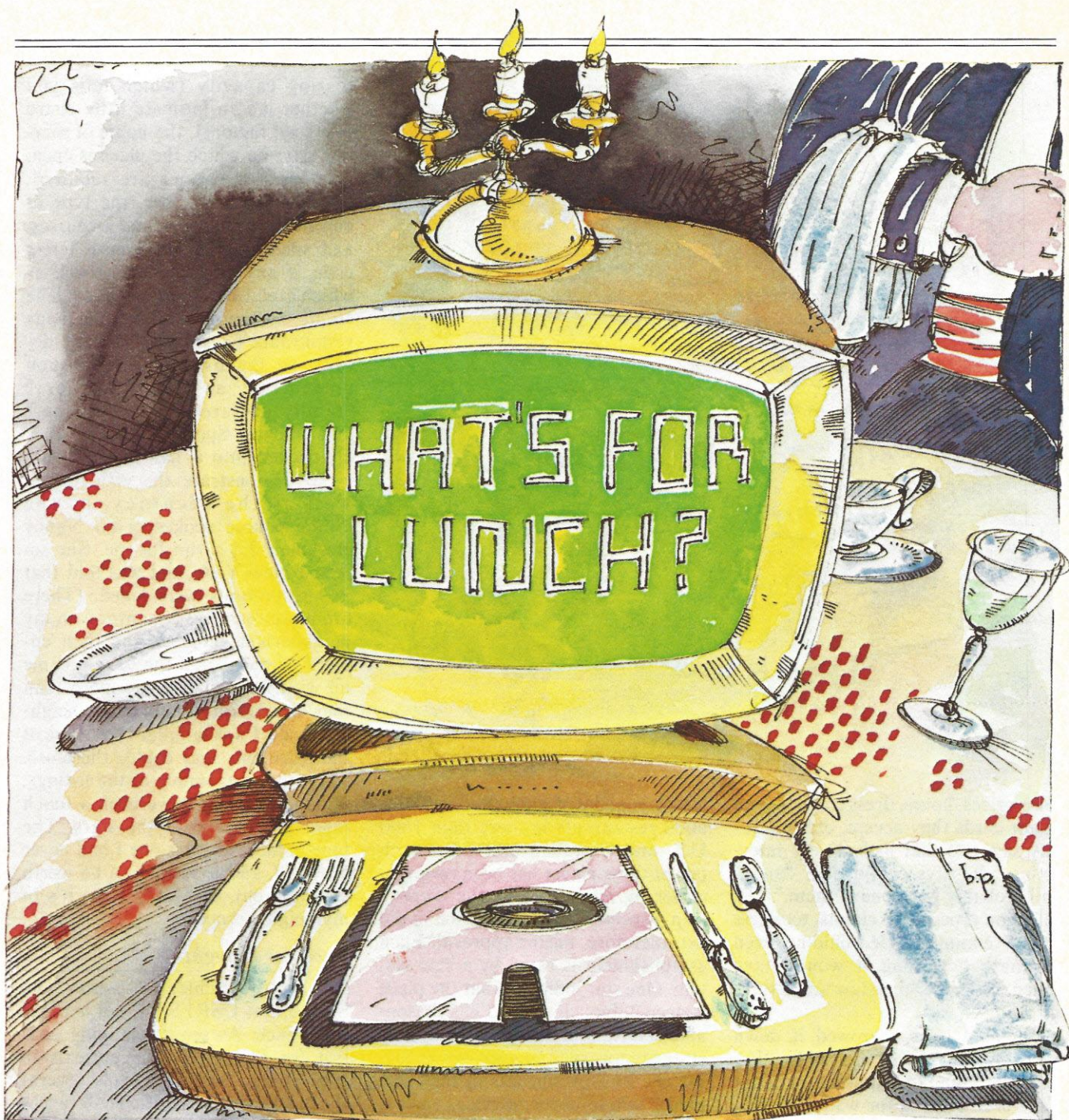
a computer. Consider, for example, the case of entrepreneur Stuart Friedman.

Friedman is the president of Geneva Technologies Corp., of Cranford, N.J., a company that specializes in providing turnkey installations of small computer systems for health-care professionals such as physicians and dentists, and for hospitals. He travels—a lot. "Over the last six months," he says grimly, "I have earned two free first-class round trips on United Airlines's Mileage-Plus program. I've probably been at 30 or more 'destinations' throughout the country." And if any destinations are new to him, he will seek out, before departing, a couple of restaurants which are likely to meet his demands.

He used to choose restaurants by looking through those little magazines that clutter hotel lobbies, and by following the recommendations of friends and business associates. But lately, he has begun to rely more and more heavily on his Commodore 8032 computer which, via The Source on-line data-base service, gives him access to details about hundreds of restaurants across North America.

"My idea of fine dining," Friedman says, "is some form of Continental cuisine—French or Italian—in surroundings that include music, that have an unhurried, calm

Now the computer
can help find the
right places to eat.

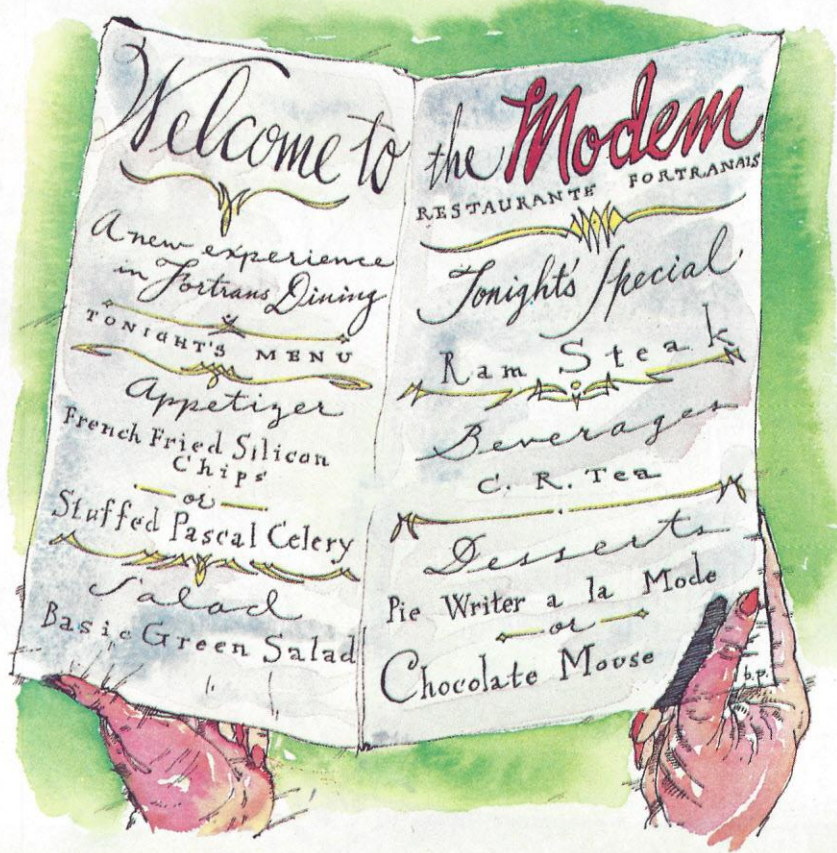


environment—places that cater to a somewhat upscale class by reason of their prices (although they are not necessarily extremely expensive); places that are reputed to have interesting dishes, well prepared, and well served.”

At the time we talked, he was plan-

ning a trip to Minneapolis, a city with which he is unfamiliar and where he knows no one he could ask for recommendations. So he sat down at his keyboard, logged on to The Source, and called for USREST, which is a computerized version of the *Mobil Restaurant Guide*. He then typed in

the city and state, was informed that there are 45 restaurants listed in Minneapolis, and 42 of them offer music while 13 offer show type music and French cuisine. “I then printed out those 13,” he says, “so I was able to get a description and a commentary about what their menus are like,



their prices, hours, dress codes, which credit cards they accept, etc. I actually saw two that looked very interesting," he says confidently, "and I will probably go to one of them." The selection process, he claims, took less than five minutes. He would not even estimate how long it would have taken to review 45 restaurant listings in print.

"I could have narrowed it down even further," Friedman adds. "For example, going to Minnesota, I might have been looking for walleyed pike, which is very popular there. I could have searched for that and seen who serves it as a specialty. That's very important to me."

In fact, there are probably a good deal more than 45 eating establishments in Minneapolis, but they don't all qualify for listing in the *Mobil Restaurant Guide*. The data base,

which is updated annually, lists over 6000 restaurants in more than 1600 U.S. and Canadian cities, but each one of those places has been reviewed either by readers or by the *Guide's* own inspectors. Mere inclusion in the list, therefore, means approval. Each establishment is rated by a star system. One star indicates that the place is acceptable, clean, and has reasonable service and adequate food. Five stars are awarded to what are probably the best restaurants in the land, places where decor, service, various and sundry amenities and niceties, and of course, cuisine, are of the highest caliber. Chances are the prices are, too.

A typical listing in USREST begins with the restaurant's name and address, telephone number, and geographical location (e.g., "1 blk N of Lincoln Center"), followed by the

seating capacity (which tells you whether it's an intimate little bistro or a food factory), the hours of serving, days on which the place is open, whether reservations are required, whether there is a bar, the type of cuisine, price range of main courses, and specialties of the house. Dress code, if any, is specified, as well as which credit cards are accepted. The *Guide* recognizes that people judge restaurants by seemingly small details, so the listings include such statements as "chef-partner," "family operated," "own baking," and "spoken: Spanish, Italian." It is all packed into a half-dozen lines.

To demonstrate the efficacy, as well as the accuracy, of the *Guide*, Source spokesperson Nancy Beckman did a run for me. She selected New York, and was told that 243 restaurants were listed. (There are more than 243 restaurants in my neighborhood alone.) She then entered "Greek," and the system came up with four. (There are more than four Greek restaurants in my neighborhood.) I was familiar with three of the selections and could, therefore, attest to the accuracy of the listings, although I might have been a touch more generous with the stars. The fourth, however, was one I had never heard of, and it seemed to be worth checking out, especially since it's in my neighborhood.

Food for thought

Dr. Andrew Schlein also uses The Source, but USREST is not his first preference. As senior planning analyst for Pfizer Pharmaceuticals in New York, Schlein travels several times a year to scientific conferences and conventions. Schlein uses one of his Apples (he has an Apple II at home, and an Apple III in the office) to communicate with other people on The Source's and CompuServe's various "mailboxes" and "bulletin boards."

"I'm going to San Antonio in a couple of months," Schlein told me,

*The data base lists over
6000 restaurants in more than
1600 U.S. and Canadian cities.*

"and I'd like to find out what good Mexican food is. They keep telling me there is such a thing as good Mexican food; I just haven't found it." I assured him he would find it in San Antonio, but I couldn't remember the name of the restaurant where I had eaten it. It didn't matter. He felt certain that where I had failed, USREST would not. But first, he was planning to put out a call on the two networks. "I don't know anyone in San Antonio I can talk to, so I might leave a message that says: 'I'm planning a trip to San Antonio. Need help with restaurants. Any suggestions?'" That's guaranteed to elicit some kind of response, even if it's a response that says, "There are no restaurants in San Antonio!" (Not likely, however; there's a little Mexican place along the river bank that... Well, never mind.)

Schlein craves variety, not only in what he eats, but how, which, of course, affects his restaurant selections. On occasion, he entertains a physician or some other expert who may be able to provide some insights for his work. (Schlein develops long-range plans for pharmaceutical products.) That requires a quiet, dignified setting where he and his guest will be allowed to sit and talk. At times, he travels with his wife, and, depending on their mood, they may want a homey, intimate place, or one with some razzle-dazzle.

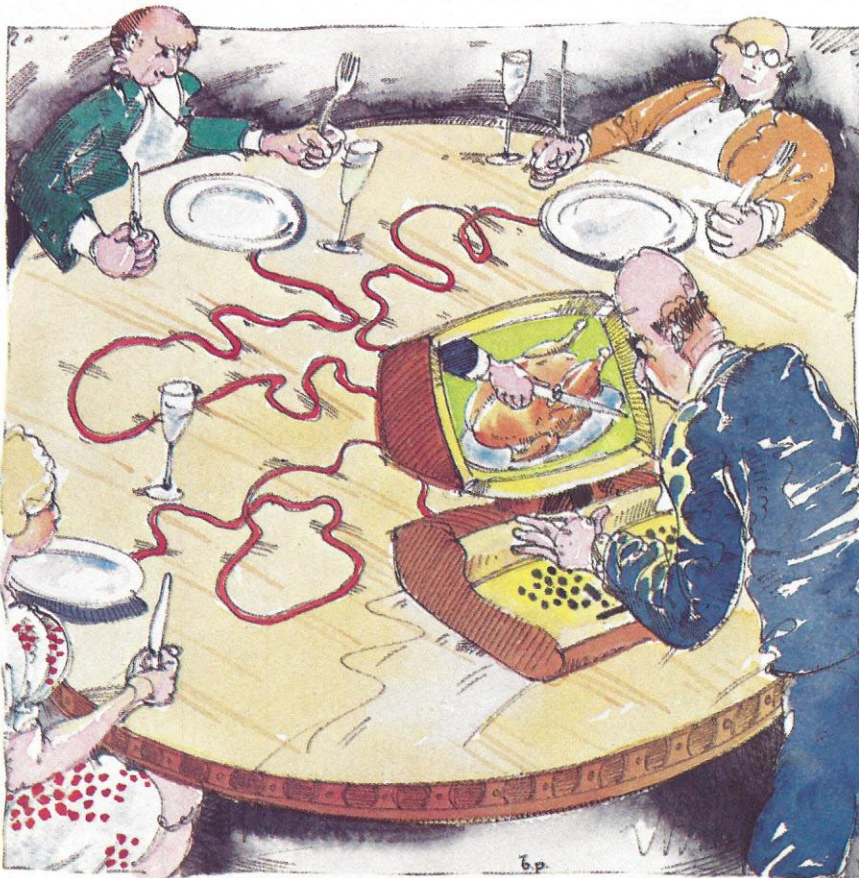
Much of the time, however, he dines alone. "It's not a lot of fun," he says, "going to a hotel dining room alone. I'm not comfortable eating alone under those circumstances." He looks for a restaurant that is perhaps a bit less formal, "where you can actually talk to the waiter." In such

RESTAURANTS ON LINE

The *Mobil Restaurant Guide* is available on-line from The Source. The *Guide* contains over 6000 restaurants and is updated annually. Listings include menu descriptions, hours of business, price ranges, specialties of the house, entertainment, and credit card and reservation information. The Source also provides various "bulletin boards," "columns," and electronic mail facilities through which a general call for information and recommendations can be placed. Source Telecomputing Corp., 1616 Anderson Road, McLean, VA 22102; (800) 336-3366.

CompuServe, The Source's major competitor, does not yet have a restaurant rating service. (According to a spokesperson, the company is, at this writing, preparing to run a test of such a service for restaurants in the Columbus, Ohio, area.) But "broadcasting" features similar to those offered by The Source—including a CB-type service—are available. CompuServe Inc., 500 Arlington Blvd., Columbus, OH 43220; (800) 848-8990.

DIALOG carries Information Access Company's "National Newspaper Index" and "Magazine Index" which, minimally, give references to restaurant reviews, along with grades on the establishments, based on the reviewers' assessments. Maximally, users can access reviews which have appeared in magazines and in *The New York Times*, *The Los Angeles Times*, *The Washington Post*, *Christian Science Monitor*, and *The Wall Street Journal*. Dialog Information Services Inc., 3460 Hillview Ave., Palo Alto, CA 94304; (800) 227-1927; in California, (800) 982-5838. Information Access Company, 404 Sixth Ave., Menlo Park, CA 94025; (800) 227-8431; in California, (415) 367-7171. Bon Appetit.



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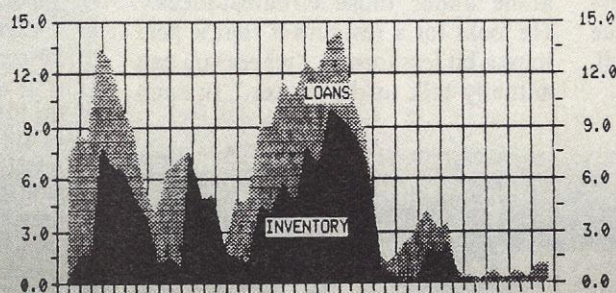
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Computer restaurant listings can help you establish your own mental data base of eating places.

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instances, he is not likely to know anyone who can recommend a place.

But armed with a printout or two from his computer, he invariably manages to dine well.

Electronic reviews

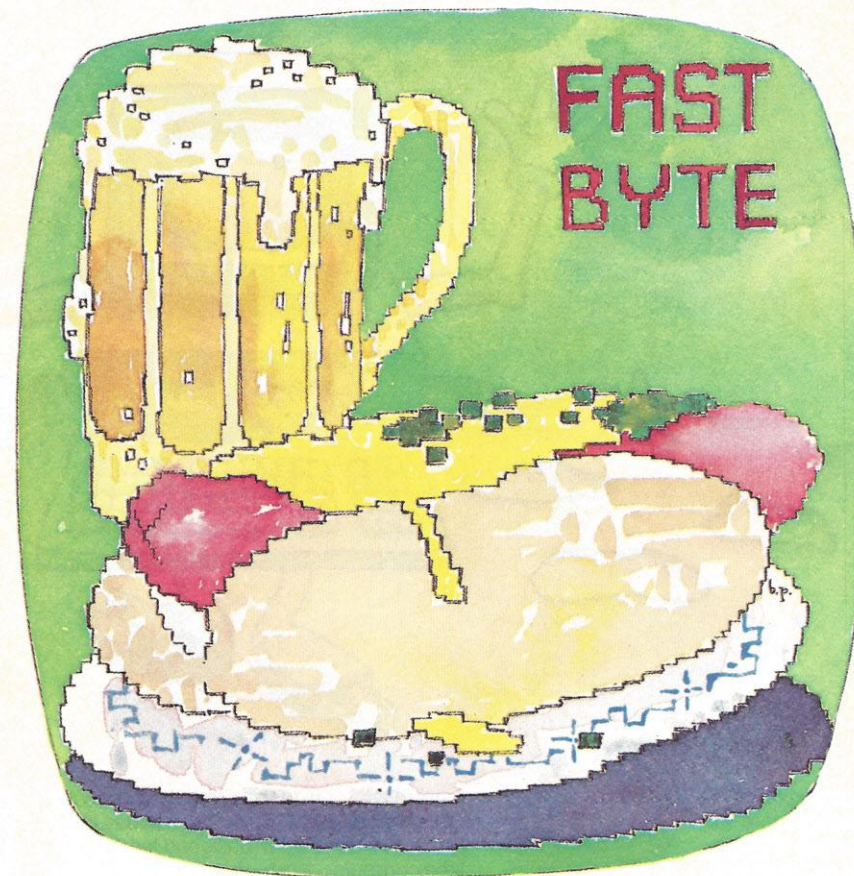
If you're willing to rely entirely on someone else's judgment, there's a fairly foolproof method for selecting an excellent restaurant in a major city. Information Access Company, of Menlo Park, Calif., provides two data bases via the DIALOG service.

"Our first data base," says Susan Higgins, Information Access's on-line services representative, "is called 'Magazine Index.' It's a bibliographic index of over 400 popular magazines. Many of these magazines contain reviews of restaurants."

These reviews, she explains, are indexed and listed just like any other magazine article, with one difference: "We add a feature called 'grade,' which is an interpretation of what the reviewer thought of the particular restaurant. So, if someone is reviewing the Russian Tea Room and thinks it's the greatest restaurant they ever dined in, we would assign a grade of A+. It's just like school—A, B, C, D, F." She agrees that since the grade is assigned by the indexer, there is a slight chance for arbitrariness to creep in. One indexer might assign a grade of A-, whereas another might have assigned B+.

The second data base is the "National Newspaper Index," which does essentially the same thing for articles and reviews appearing in *The New York Times*, *The Los Angeles Times*, *The Washington Post*, *Christian Science Monitor*, and *The Wall Street Journal*.

Higgins also sent along some sample printouts from both indexes. The listings, however, give little information beyond the name of the establishment, the city in which it is located, and the grade. The rest of the data consists primarily of research details, including various key words




for search purposes, to enable the user to access the actual review. Still, one could readily call up all the "grade A" or "grade B" restaurants in a locale and be assured of having a list of places critics like.

Speed and convenience

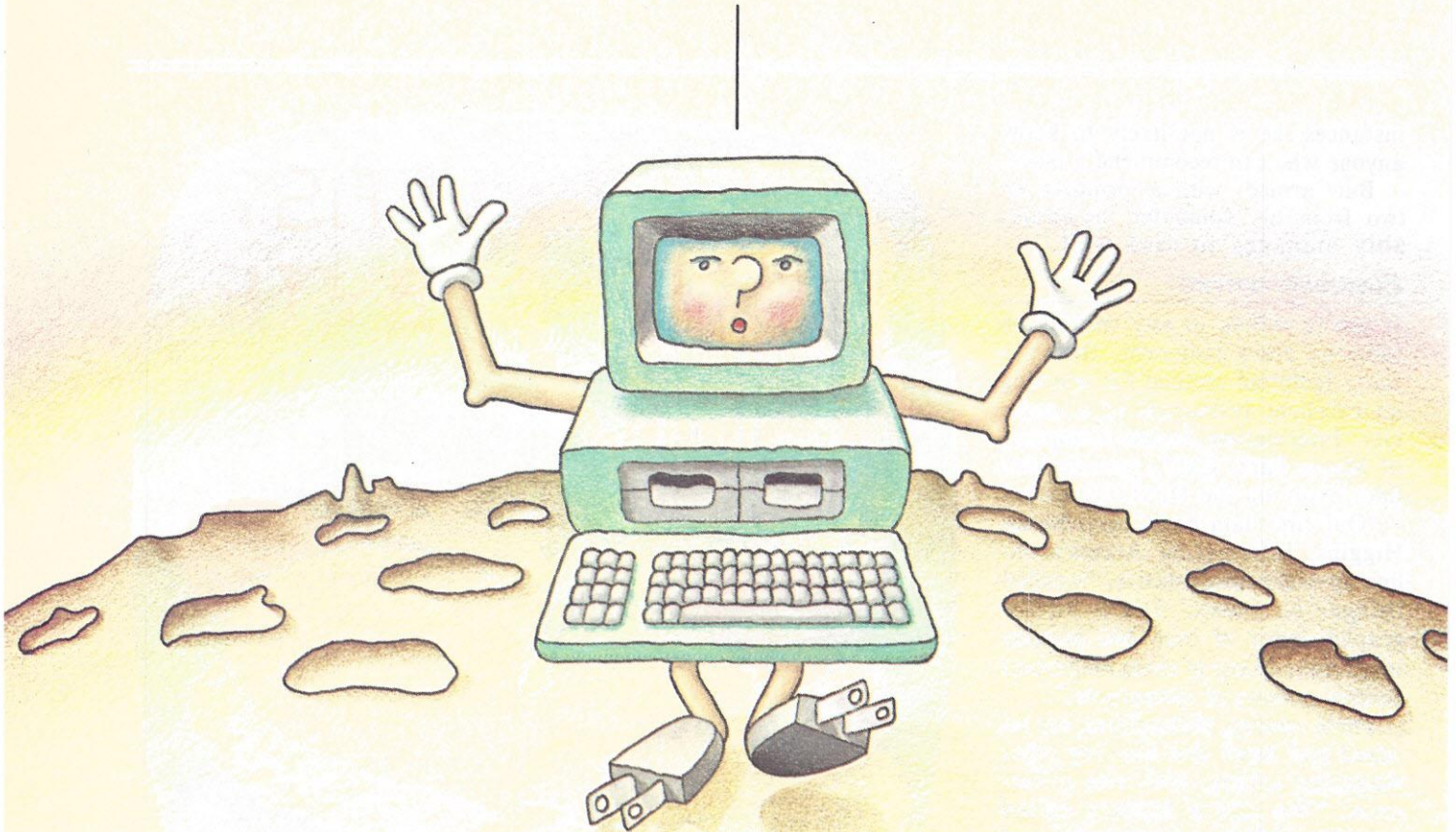
Although a number of travelers take full advantage of their personal computers to access available information about where to eat when far from home, there seems to come a time when the keyboard is abandoned in favor of personal experience. As Stuart Friedman points out, "The speed and convenience (of on-line resources) are just that—speed and convenience. You've had all of this information available in written text for years, and you learn how to evaluate it. What the computer gives me," he concludes "is the ability to get my

hands on that information a hell of a lot faster, without having to read volumes . . . Once I get my hands on it, I know what to do with it."

It's clear that computer restaurant listings can't take the place of personal experience and taste. But they can help you establish your own mental data base of eating places and can guide you in choosing restaurants in unfamiliar cities. Even the most dedicated gourmet would have a hard time keeping track of all the restaurants that open (and close) in the United States every year. And even the most worldly palate craves the occasional change.

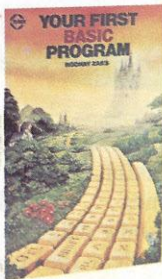
So next time you have a client with a penchant for Peruvian cuisine served in Art Deco surroundings, maybe you should let your fingers do the walking—over your computer's keyboard. 

"What more can I do?"



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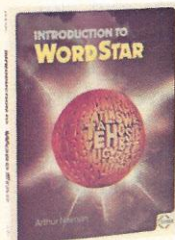
The Easy Guide to Your Apple II by Joseph Kascmer (\$9.95) Never before has getting started with your computer been so easy! Each practical operation that you can perform with your Apple computer — word processing, mathematical calculations, budgeting, filing, and more — is explained here in simple terms.

Mastering VisiCalc by Douglas Hergert (\$11.95) Tells you how to get the most from your "electronic spreadsheet," for tasks ranging from planning to examining projection scenarios.

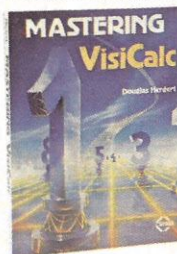
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The Chip At 35

This year marks the 35th anniversary of the invention of the transistor, forerunner of the microchip and herald of the new computer age

by Monte Davis

Imagine a railroad built without metal of any kind. Picture the long hand-sanded wooden rails stretching toward the horizon. There in the distance, a powerful rock maple locomotive is coming toward you, steam puffing from its big ceramic boiler. You can almost hear the light, strong, wicker passenger carriages clicking along behind, and the creak of their leather-strap suspension. Above you, the semaphore arms swing up and down, telling the next tower that the 4:02 is on its way...

It's absurd, of course. Without metals, even working with wood on that scale would be impossible. In the late Middle Ages, oxen pulled wagon trains along short plank roads—but they did it only at the mines, where the weight and bulk of metal ores made it worth the trouble.

Now try to imagine a computer without the transistor. It isn't so absurd, because there were serviceable computers already in operation 35 years ago this month, when William Shockley, John Bardeen, and Walter Brattain published their discovery of the junction transistor.

Some of those computers were mechanical, like the "differential analyzer" developed by Vannevar Bush at MIT in the late 1920s and 1930s.

Monte Davis is a New York-based free-lance writer who reports frequently on science and technology.

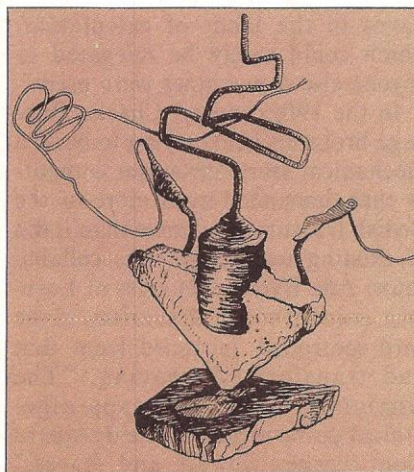


Illustration by Gelbert. Research by Bell Laboratories

The first transistors assembled at Bell Laboratories in 1947 were primitive by today's standards. Yet, they revolutionized the electronics industry and changed our way of life.

Its shafts, wheels, and cams spun out answers to calculus problems, and a number of variations on that analog theme had been developed.

But the limits imposed by mechanical friction made electrical and electronic approaches more promising through the late 1930s and the war years. Konrad Zuse had built several models in Germany, and English researchers had built computer-like "emulators" to decipher German signals. In the U.S., there were the machines developed by John Atanasoff at the University of Iowa, by George Stibitz at Bell Labs, and by Howard

Aiken at Harvard. Depending on the problem, these electromechanical hybrids could be up to 50 or 100 times as fast as a person with a desk calculator.

The most highly advanced computer as of mid-1948 was the ENIAC, built at the University of Pennsylvania's Moore School of Engineering by John Mauchly, J. Presper Eckert, and Herman Goldstine. More completely electronic than any of its competitors, ENIAC was hundreds of times faster. It contained more than 17,000 vacuum tubes and 1500 relays in 40 man-high panels.

As for ENIAC's capabilities—well, a \$5 calculator that slips into your checkbook today is slightly faster, and to be fair, it can't handle most of the complex calculations ENIAC was designed for. You'd have to spend closer to \$100 to get a programmable model that could beat ENIAC hands down. It would offer a few other advantages, too: You wouldn't need a sheaf of punched cards for input; you wouldn't have to spend an afternoon resetting 6000 switches and patch plugs to go from a statistical problem to an accounting one; and you wouldn't dim all the lights in your neighborhood by drawing the 130 kilowatts that ENIAC required.

In hindsight, computer designers before the transistor seem like railroad builders without metals. There's

only so far you can go in reinforcing a clay boiler, or greasing the axles with top-quality lard. Vacuum-tube computer technology wasn't a dead end, but fairly soon it would have run up against limits of size, cost, and reliability.

Even in 1960, before the full impact of the transistor revolution had been felt, there were several thousand computers in service. But by 1970, with integrated circuits pouring out of the factories, there were more than 80,000. By 1980, IBM found itself with orders for more computers than it had delivered over the previous 30 years. If you count word processors and other dedicated microcomputers, today's total computer census is about five million; if you count all the microprocessors in video games, calculators, appliances, automobiles and even high-tech stereo equipment, 100 million might be closer to the mark.

By making computers smaller, cheaper, and more reliable, the transistor opened up capabilities and applications nobody could have imagined in 1948.

A matter of patterns

Why did the transistor make such a difference? Ralph Gomory, vice president of research for IBM, puts it well: "In computing we *don't do any work*. We just transform one pattern to another. You could take the materials in a car and use them to build a thousand little cars, but they'd be toys instead of vehicles. Take the material in an early transistor and reprocess it into a million logic gates or memory cells, and every one can do the same job as the original."

So computation is a matter of patterns. Its "work" is rearranging information, not matter or energy, as in most other technologies. Part of the reason for the explosive spread of computers during the last half-lifetime is that people like Claude Shannon (the electrical engineer who inaugurated information theory) and John von Neumann had a firm grasp

of that insight. The theory and the attitudes necessary for computer science were in place long before the hardware was ready.

In fact, the theory can be traced back as far as the 17th century, when the mathematician Leibniz envisioned a "universal mathematics"—a language with a grammar so logical that the proper formal statement of a problem would automatically lead to its solution. Leibniz also noted the elegant simplicity of binary arithmetic, and invented a four-function calculator, observing that "it is unworthy of excellent men to lose hours like slaves in the labor of calculation, which could safely be relegated to anyone else if machines were used."

In the 19th century, Charles Babbage broke his heart trying to build a mechanical stored-program computer that demanded even more of the British treasury's patience than it did of existing technology. His collaborator, Ada Byron, Countess of Lovelace, pointed out its similarities to the card-controlled Jacquard loom that had transformed weaving. "The Analytical Engine weaves algebraical patterns just as the Jacquard loom weaves flowers and leaves," Ada wrote. In the same period, George Boole's work on symbolic logic laid the foundations for the 20th-century flowering of mathematical logic and the contributions of Shannon, von Neumann, Alan Turing, Norbert Wiener, and others.

Independent principle

So by the late 1940s, it was clear that a computer's operating principles were independent of its mechanism. Any device capable of storing and transforming data rapidly and reliably would do. It was von Neumann who took the final logical step by proposing that the processing instructions be stored in the same notation as the data, allowing a computer to change its own operating patterns rather than waiting for switches to be reset when it moved

from one phase of a problem to the next.

The final *logical* step—but technically, the computer was still a toddler. Even though ENIAC had been designed to minimize the demands on its vacuum tubes, two or three of them burned out every week. It was easy to track down a single tube, but as Herman Goldstine recalled later, "The greatest difficulty came about when, on rare occasions, two tubes would fail simultaneously. Then the observed symptoms were always highly anomalous, and von Neumann once jokingly described keeping the ENIAC operative as "fighting the Battle of the Bulge every day." Improved models followed, but the bigger the computer, the more tubes it had; the more tubes it had, the sooner one was bound to fail.

Take a look at a vacuum tube, even if it means going up to the attic to find an old radio. (If you're over 30 and want to feel decrepit, consider that there are whiz-kid programmers out there in college who have never seen any vacuum tube except a CRT!) The tube "boils" electrons off a hot cathode, and controls their travel to the positively charged anode by varying the voltage on a grid. It's reasonably fast, far faster than a switch or relay, because electrons have far less mass and inertia than the most delicate metal contact bar. But it requires time and a relatively high current to heat the cathode, and the tube throws most of that heat away. It takes elaborate mechanical processes to manufacture. It can't be made much smaller than the tiniest Christmas-tree bulb. And the smaller and finer the parts, the sooner heating and cooling stresses will break a wire or filament somewhere.

The transistor uses a fundamentally different physical process to regulate current flow. Instead of raising the energy of electrons so they will cross a gap, it lowers the potential barrier to their movement within a semiconductor. In a semiconductor

Small, unified, and cheap, the transistor was the answer to the computer maker's prayers.

carefully "doped" with impurities, it takes very little external energy to make the difference between "flow" and "no flow." The raw material is silicon, which makes up one-fourth of the earth's crust. Most important of all, a transistor works just as well (or even better) when it is microscopic as when it is the size of a pencil eraser, like the first ones.

The answer to a prayer

Low current, little heat, one cheap solid part, and a minimum size so small it's taken 35 years of breakneck progress to get anywhere near it: The transistor was the answer to a computer maker's prayer. And fittingly, the computer provided a market for countless transistors, which radio, radar, and television did not: Their analog circuits needed few active elements and high amplification, while the computer's digital circuitry required large numbers of switches but no gain at each stage.

One other 1940s technology was concerned with large switching networks: It was no accident that William Shockley was at Bell Labs when he began his solid-state experiments before World War II. Nor should it be surprising that IBM and AT&T today find themselves in quiet but titanic competition. The inside of a computer functions very much like a complex telephone system, and as the U.S. telephone system takes on more digital processing roles, it functions more and more like a vast computer.

Is there any other technology that deals in information—a product that is essentially the same, no matter what the material or scale involved? There is, and it's been around for centuries: It's called printing. It makes no functional difference whether words are incised on a clay tablet or carved ten feet high in granite. As the Chinese discovered, it requires no very advanced technology to make copies. And the more copies you make, the lower the cost of each one. Information, unlike matter and ener-

gy, can be manipulated and duplicated and disseminated at a minimal cost.

The Gutenberg printing press unleashed a cultural revolution that is still going on. The increased availability of the Bible, especially in languages other than Latin, had as much to do with the Protestant reformation as did Martin Luther's combative temper. Still, books remained expensive for centuries after Gutenberg; it wasn't until the 19th century that mass publishing and mass literacy began to develop hand in hand.

The computer revolution has been headlong by comparison. In the last few years, the cost of a single transistor on a large RAM chip has dropped below the cost of a single printed word in a hardcover book, and it is still falling. In 1977 Alan Kay, then at Xerox and now at Atari, drew the comparison sharply:

"Like the handmade books of the Middle Ages, the massive computers built in the two decades before 1960 were scarce, expensive, and available only to a few. Just as the invention of printing led to the community use of books in a library, the introduction of time-sharing in the 1960s partitioned the capacity of expensive computers in order to lower their access cost and allow community use. And just as the Industrial Revolution made possible the personal book by providing inexpensive paper and mechanized printing and binding, the microelectronic revolution of the 1970s will bring about the personal computer of 1980s, with sufficient storage and speed to support high-level computer languages and interactive graphic displays."

Refining the transistor

There are other intriguing connections between printing and transistor technology. The first commercial transistors were chunks of germanium or silicon sealed in a metal canister, with contacts sticking out. They were used just like the vac-

uum tubes they replaced, with wires soldered to each contact point, and people thought of them as electronic parts—small and handy, but still "parts."

Then came the printed circuit board. Predetermined wiring paths were etched into a sheet of plastic, then filled with thin lines of copper. The "parts" were individually plugged or soldered into place. That cut down on wiring mistakes, but there was still a chance of human error or faulty contact at the spots where the components met the circuit board. Well into the 1960s, the insides of most computers looked like glorified transistor radios, with racks upon racks of boards.

But meanwhile, the solid-state theorists, the electrical engineers, and the transistor production specialists had been busy. They had learned to make purer silicon, in larger low-defect crystals that could be sliced into larger wafers. They had learned precise techniques to "dope" it, not in the molten state, but by implanting ions directly into solid silicon. They had learned to make solid-state diodes and capacitors and resistors. They had learned to make thinner and thinner films of silicon, metal, and insulators.

From the late 1950s onward, the manufacture of computer circuits became more like printing and less like any traditional assembly process. Instead of cutting or milling or grinding parts, the makers worked like photo-engravers, with masks and light-sensitive chemicals, etching away a layer here, depositing a new one there. The distinction between the active circuit elements and the passive connections disappeared, as both were produced at the same time by the same methods.

And just as printers had discovered that larger production runs drove down the cost per copy, so did the makers of transistors. It became worthwhile to put more and more parts on a single chip, so that the

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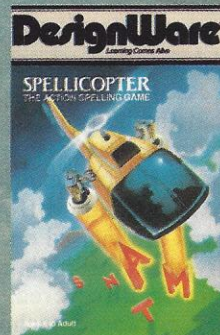
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Where will computers take us? What do we make of them? What do they make of us?

ESSAY

costs of designing a circuit and making the masks would be spread over more units.

Researchers at Texas Instruments, Fairchild Semiconductor, and other firms led the way to integrated circuits, the second phase of the transistor revolution. They realized that the more elements they packed onto a chip, the fewer chips and the fewer connections would be needed.

The solid-state reliability that had characterized transistors from the beginning could now be extended to hundreds, thousands, or tens of thousands of them as a unit.

All on one chip

It was only a matter of time before the entire central processing and control unit of a computer would be manufactured as one chip. 1968 is as good a date as any to mark that development. That was when Robert Noyce, who had directed integrated-circuit research at Fairchild, left to become one of the founders of Intel. For a couple of years, as it pushed toward unprecedentedly large-scale integration, Intel was at the risky edge of the state of the art. But by the late 70s, there were 20 companies making microprocessors and more than 100 incorporating them into computer systems.

The cost of transistors has dropped so low that less than 10 percent of the value of electronic equipment is in the integrated circuits, with the rest in mass storage, assembly, and input/output devices. Similarly, only a fraction of the cost of a book is in its paper and ink and binding: The rest is the publisher's costs of editing, promotion, and distribution. (Book authors and computer programmers are given to the same glum reflections about the size of their take and the villainy of copying without royalty payments.)

Where will the transistor revolution take us? On the hardware front, there are reasons to believe that exponential reductions in size and in-

creases in complexity will have to level off. Sol Triebwasser, a physicist on IBM's Research Review Board, defines the limits of miniaturization as "the dimensions where the physics involved is not well understood." At very small dimensions, local electric fields become large enough to distort current flow, and random thermal vibration can break a conductive path or create an unplanned one. "Depending on who you talk to," Triebwasser says, "we're looking at limits around .1 to .5 micron, and the smallest reliable features we can get in the lab today are around 1 micron. I don't think there's a problem this decade—next decade, maybe."

There are technical, if not scientific, limits to the complexity of very large scale integration. The more functions there are on a chip, the harder it becomes to test every possible configuration, and the harder it is to get a cost-effective yield of usable chips. There's no point in designing and fabricating 10Mb memory chips if the quality control process discards 99 percent of them.

By contrast, the software field still appears wide open at all levels. There are fervent advocates of every programming language from FORTRAN to ADA, the new U.S. government standard named for the Countess of Lovelace. Those who have discovered the charms of LISP and Pascal can't remember what they ever saw in BASIC. It's no more likely that a single ideal, all-purpose language will emerge in the near future than that English (or Mandarin, or Esperanto) will become a world language.

In "ready-made" programs, both free-lance programmers and those working for Apple, Atari, and other firms agree there is a steady "upward" pull on users of video games and home computers alike. Users demand more user-friendly applications programs and more challenging game programs as they gain experience. Whether Apple's Lisa succeeds

or not, it's a safe bet that more manufacturers and programmers will make the effort to accommodate people without previous experience. "I'm tired of hearing about the importance of 'computer literacy,'" says one Commodore executive. "Since the first high-level language, it's been obvious that computers can move toward English faster than people can move toward machinespeak."

Another safe prediction is that input and output systems will continue to be developed aggressively. Consumer response has shown that it's worth using large amounts of machine capability to achieve better graphics, or to position a cursor with a joystick or track-ball rather than a keyboard.

Where are we headed in the long run? After 500 years of our first information technology, and 100 years of mass literacy in the developed countries, people are still debating whether that experiment will turn out well—but nobody is inclined to reverse it.

There are important differences between the printed word and the computer, of course. In a sense, you bring your own central processor along when you visit the library: The books on the shelves range from raw data (charts, tables, directories), through all the ways you can interface with another human processor (fiction, poetry, history, biography), to raw programming (how-to, self-help, and polemics). A computer, because it can carry out so many of the sorting and organizing functions we used to think were exclusively human, has potentials we are only beginning to understand: to dominate and constrain your thinking, or to aid and expand it. Of a book, we tend to ask, "What did it mean to you?" Of a computer, "What can you do with it?"

The real questions in both cases are the same: "What do we make of them? And what do they make of us?"



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Configure Your Business To Protect Information Assets

Every business, large or small, has proprietary information it needs to protect. With personal computers, local area networks, and telecommunications becoming so common in offices and homes, however, such information is often accessible to unauthorized users—users who may range from the midnight hacker snooping through salary records to the cold-blooded competitor stealing customer lists, trade secrets, or goods and services. This column explores ways in which any business relying on personal computers can physically and legally protect its information assets—and what legal recourse is available should the security system be breached.

The column was prepared in consultation with Susan H. Nycum of Gaston Snow & Ely Bartlett in the firm's Palo Alto, Calif. office. Nycum, who is the partner in charge of the law firm's high technology group, has a 20-year background in computer law. She was the director of the university computer facilities and in-house counsel for Stanford and Carnegie-Mellon. In 1975, with Robert P. Bigelow, she wrote *Your Computer and the Law* (Prentice-Hall, now being revised); she is now completing a book (with George Bosworth III) on the protection of proprietary rights and software, for Reston Publishing Co. Nycum is past chairman of the Science and Technology Section of the American Bar Association, and current vice-president of the Computer Law Association.

Every business has proprietary information that is crucial to its daily work. The exact nature of that information will vary from one business to another—trade secrets, financial ac-

counts, custom software, patient records, credit ratings, and inventory lists are but a few common examples. This information is an asset as surely as furniture or cash—and it must be protected against unauthorized access.

The best security systems protect your information in three ways: physically, procedurally, and technically. These are not alternatives to one another; instead, they safeguard your assets by several layers of protection. More important, even if your security system should be breached, all the precautions you take have legal force in protecting you from allegations of negligence—allegations that otherwise could present problems for insurance claims and shareholder litigation. Moreover, the safeguards will afford you some evidence of what happened and how, which can help you trace and prosecute the culprit.

Assessing your assets

Security involves nothing less than setting up a whole policy for your business. First, you must identify the key information assets present: What is it that you wish to protect? How important is each asset to you and your business? Be aware that your key asset may not be one that everyone thinks it is—for example, if you're in a high technology business, it may be that your key asset is not the design of new products you're developing, but your customer list.

Having identified your assets, their value, and their priority in your business, next identify the risks to each asset: What is the worst you fear could happen? Is it disclosure of the information? Is it alteration or destruction of records? Is it theft of funds or units represented by the in-

formation? What would be the consequences to you and your business if you lost one or more of your assets to those risks?

Once you've assessed your assets and the risks, you can analyze the vulnerability of your business' existing structure and decide how to institute protective measures. This analysis will determine where you focus your time, energy, and dollars to safeguard your assets.

Safeguards and their legal weight

Physical safeguards are straightforward: They're designed to keep unauthorized people away from places where you want the security maintained. Build your security system from the ground up. Make sure that a visitor is not free to wander through your offices by asking for the key to the restroom. There are ways of fitting personal computers with locks that require a special key or ID card in order to turn them on; make sure employees who leave your company are no longer able to get into the system via a key to the office or a user identification.

Procedural safeguards are rules for such precautions as keeping logs of the use of the personal computers, or for clearing desks and erasing blackboards at night. If some unauthorized person should gain access to your offices at night, you don't want him to be able to simply photograph notes of your latest calculations or corporate strategy. Procedural safeguards also include keeping up-to-date backup copies of your master files (also protected by safeguards) to prevent losses through extortion, carelessness, or acts of God.

Technical safeguards are control features that you can build into your

software to prevent unauthorized access (say, by password), and to provide an audit trail of transactions and users. This type of protection is particularly important if your personal computers are connected in a network. On interactive systems it should be possible to print out this record as the transactions are made. On a number of occasions, espionage has been uncovered simply because an alert operator was watching the kinds of transactions going on. In any event, have some after-the-fact record that a file has been accessed, and by whom. It's also important to be able to trace whether your personal computer network has any hidden capabilities that may leave your information assets exposed—something of particular concern if your personal computers are connected to a mainframe computer.

Legally, you must ensure that your audit-trail policy is consistently applied, or under litigation the evidence it reveals won't be credible. In the event of litigation in which you show that your records don't match a defendant's claim, you must introduce your evidence under the Business Records Exception to the Hearsay Rule. Those records must be ones that are made in the ordinary course of business at the time of the event, and they will stand up only if they're made on a routine basis. In most cases, good business records have been used successfully in both civil and criminal cases.

You can also protect yourself by legal agreements with your employees. It's important that they should understand their responsibility to the company and the use of the personal computers they've either been issued or allowed to bring to work. In particularly sensitive areas of your business it is very important to have confidentiality contracts with your employees, so that both you and they know who has rights to what information. Every company has proprietary rights, regardless of whether

it's a high technology firm or a retailer. Many new businesses are not aware of how to protect their proprietary rights. The employee contracts should spell out your business' policy on the ownership of trade secrets or ideas developed in the course of your business—and what should happen with that information if an employee leaves to join a competitor.

You should also be aware of how people are doing after you've hired them. There are lots of stories of people who have gone wrong because they've had either an unsharable problem, such as a gambling addiction, that they thought the computer could help, or they've become disgruntled in some way, or they have been put in the way of a special temptation to which they eventually succumb. In addition, the whole phenomenon of personal computing is so new that many people will experiment with the potential of their machines and will sincerely not realize that certain things they can do are wrong. Keep your employees aware of what's important to your business and what they can do to help keep records secure.

Pursuing an offender

Will all these physical, procedural, and technical safeguards prevent snooping, theft, or destruction of your information assets? In most cases, yes. But as Donn Parker of Stanford Research Institute has observed, "With a big enough hammer you can break anything." Even all your precautions may not keep ahead of a dedicated hacker with resources.

Suppose that in spite of your security measures, someone has gained unauthorized access to your files. What can you do?

First and foremost, if the suspected offender is an employee, resist the natural reaction to grab him by the scruff of the neck, haul him into your office, close the door, lean against it, and demand: "Why did you do it?" The employee's first reaction is

probably going to be fear, and he may admit to a few things. But later on when he gets angry, which will be his second reaction, he's going to talk to somebody about his rights. And he may be able to cite you for harassment and even false imprisonment. If you don't have enough evidence to go to the public authorities about the offense, but you've publicly called attention to the incident within your company and perhaps fired him, the fellow could turn around and sue you for defamation of character and a host of other things.

Your first reaction should be to call your lawyer—for three reasons. First, it will keep you from saying or doing something that you might later regret. Second, it will make sure that all subsequent conversations between you and your lawyer will be privileged, and thus protected under the laws of evidence. Third, it'll avoid spreading the news of the incident, making it easier to collect as much data as you can very quietly, which you will need to meet a host of reporting requirements. Your lawyer will also be able to advise you on how to inform your Board of Directors (if your business has one) and handle public relations with your lenders and customers while all the evidence is being gathered.

If you do call your lawyer, gather your evidence from your business records, and decide to try to pursue the offender (be he former employee or outsider), you must then determine the nature of the offense: whether the breach of security was simply against the practices and procedures of your company, or whether it was a civil or criminal offense.

In the event that there has been no outside injury, you must be very careful in handling the case. If the act was against the policies, practices, and procedures of your business, you may be able to terminate the offending employee, or issue a severe reprimand. If the offender was an outsider, you may be able to prosecute

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him for trespassing. If the offender hasn't actually done anything yet and he's only looked at information, what you can do about it further depends on whether unauthorized looking at something is itself a wrongful act—which will depend on the nature of the information, who the looker is, and the purpose for which he looked at the information.

Civil offenses include copyright infringement, theft of trade secrets, or the unauthorized use of your computer programs to benefit a competitor. If the breach of security led to any of these acts, you may have grounds for suing under statutes for misappropriation on the civil side, or unfair competition.

Criminal acts in computing are outlined in the laws of 19 states. Right at the head of the list is "the use of computers to execute a scheme or an artifice to defraud," which covers such acts as the stealing of software, the stealing of data, the stealing of money, or the stealing of computer time. Most of those state laws go on to prohibit the unauthorized access of a computer system. Now the question for any company is, what is authorized and what is not?

Although some things are obviously not authorized, there are many close cases. For example, it is not uncommon for an employee, on his own time, to make use of resources at the workplace for professional advancement or personal work. This extracurricular use of the personal computers may in itself be permissible and even encouraged—but what might be your liability if the employee gets caught using one of your computers and modems for some shady purpose, such as running a bookie operation? In general, if the nature of the shady operation is far from the nature of your business, it is doubtful that any court would impute any sponsorship to you. However, in one case in Florida where a broker/dealer used letterhead stationery from former employers to defraud custom-

ers, the companies were cited for negligence of supervision. Part of your company policy should address the limits of authorized and unauthorized use of personal computers.

There are about 40 federal laws that are useful in prosecuting computer crimes. Two of the most useful ones are the federal statutes against wire fraud and mail fraud. If you find that either the telephone lines or the mails have been used in a scheme or artifice to defraud your business, it's fairly likely that a federal law has been violated. So if somebody taps into your transfer of data via modem, they can probably be indicted, not under a computer law statute, but under wire fraud, depending on the evidence at hand.

Another thing your lawyer can help you decide in any prosecution is how best to bring in the public authorities. There are a lot of reasons for carefully timing their appearance. If you find your security system has been breached, your instant reaction may be to call the police. But the first question the authorities will ask you is: "Where's the evidence?" Many people don't realize that law enforcement officials don't have to accept prosecution just because you say you've been robbed. They can decline. You may need to take inventory of what has been lost, gather the records indicating how, and work up a clear case with your lawyer before calling in the public authorities. The case may be particularly delicate if, for instance, you're in one county and your data may have been intercepted from another county that is out of the jurisdiction of the local authorities.

Let us assume that you can gather good evidence and the case goes to trial, and the culprit is identified and judged guilty. The penalty he'll suffer for breaching your security will depend on whether you're pursuing a civil or criminal case. When you prosecute a person civilly, say, for infringement of copyright or for violation of trade secrets or patents, you

can sue for damages to make yourself whole again. When the culprit is prosecuted under criminal law, you will not receive any restitution—but the culprit will be made to pay a fine or go to jail. How you wish to sue may depend not only on the nature of the case, but whether it's important to you to gain restitution or to make a public example of the culprit.

In some cases—say, if the person stole software or trade secrets to go into business in competition with you—you can pursue both civil and criminal suits. In such a case, the court will usually stay the civil proceedings while resolving the criminal case first. One of the reasons is that the standards of proof are higher for a criminal action: You have to prove that he committed the crime "beyond a reasonable doubt." In the civil action, you must prove your case "by the preponderance of the evidence."

Rule of thumb

Configuring your business to protect your information assets is primarily a matter of planning ahead. Identify your principal assets in advance, identify the risks to those assets, and take all reasonable measures to prevent their loss. Review your measures several times a year to ensure that they are up to date as your assets evolve and change. Security and confidentiality are forms of insurance. Not only will they minimize the chances of losing your information assets, but they have legal force in pursuing culprits and in reducing your own legal exposure to accusations of not taking due care.


If you have legal questions regarding personal computing and the law that you would like to see discussed in future columns, address them to:

Trudy E. Bell, Senior Editor

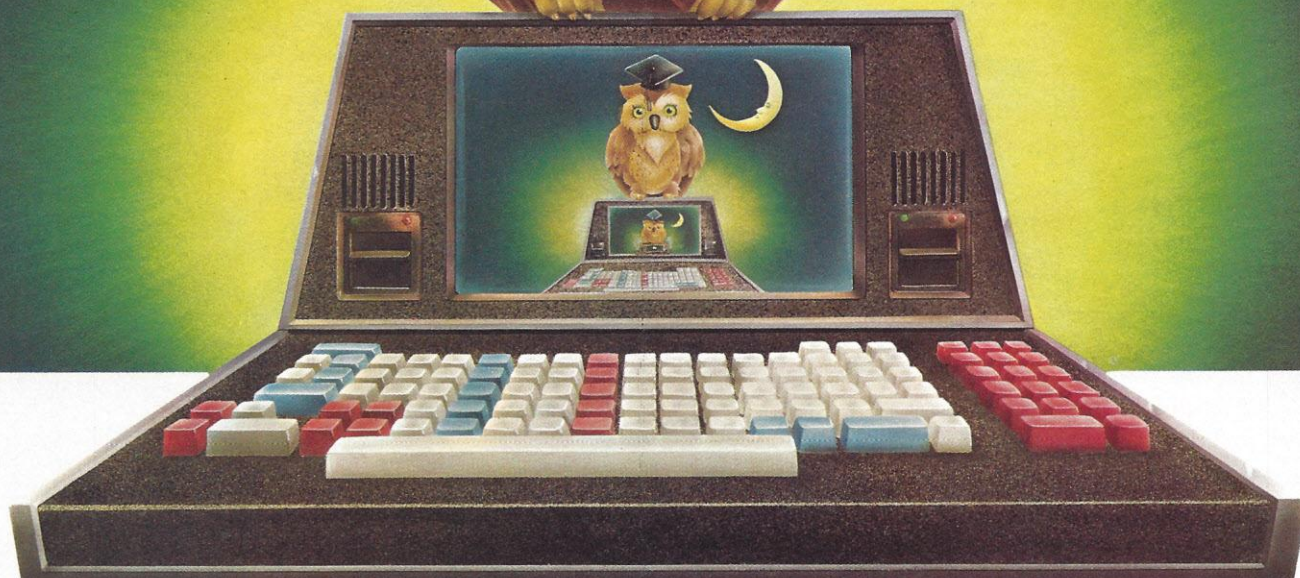
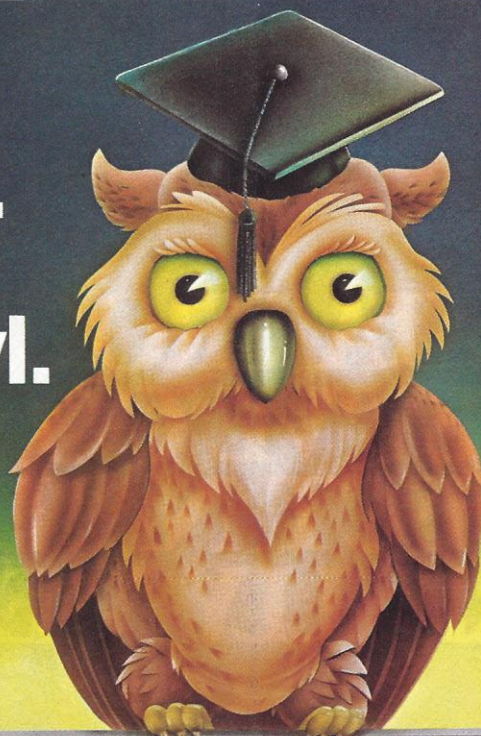
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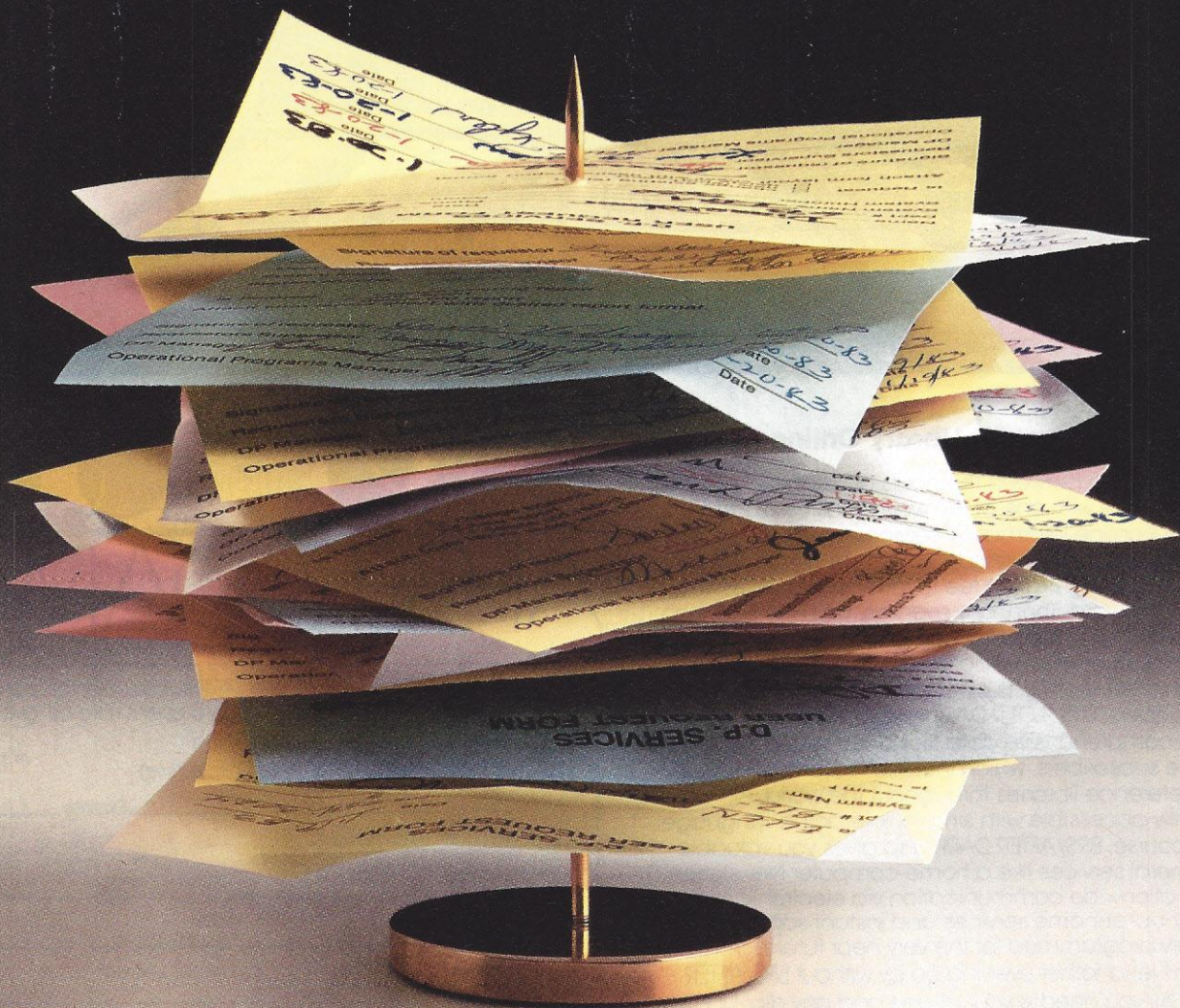
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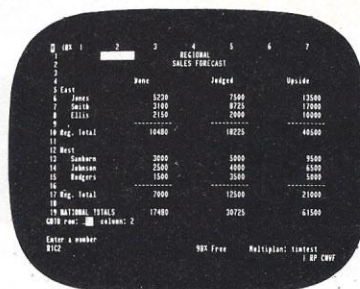
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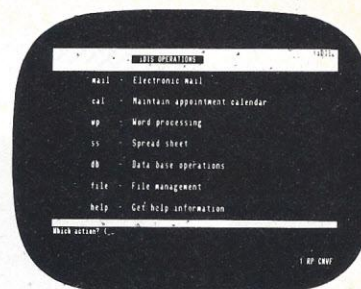
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7	Central	1100	1000
8	Northwest	900	800
9	Southwest	700	600
10	Central	500	400
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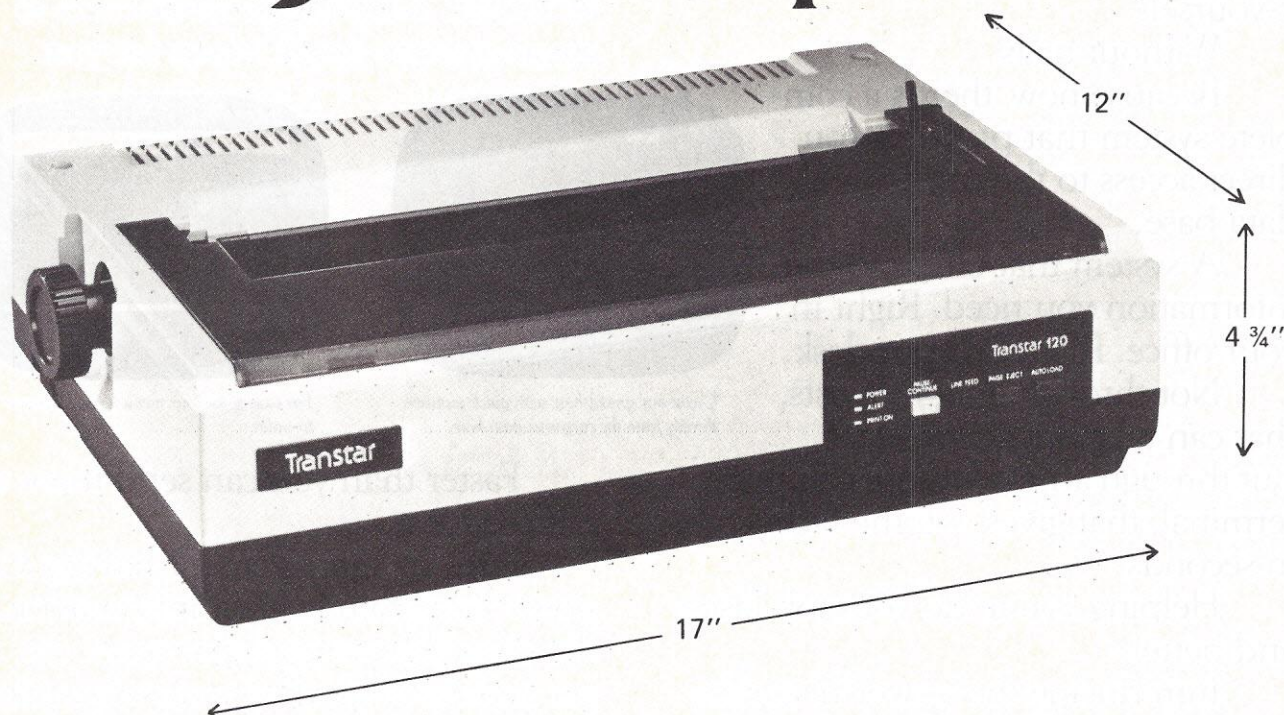
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CIRCLE 47

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Word Processing For Profit

STARTING AND OPERATING A WORD PROCESSING SERVICE

JEAN WILSON MURRAY
PILOT BOOKS
103 COOPER ST.
BABYLON, NY 11702
32 pp., \$3.50 paperback

So there's this thing dominating the den or living room that looks like a mutation of a television sired by a typewriter. It engages the attention of its operator to the point where conversation, reading, household chores, and even sex have been relegated to positions of secondary importance.

During the day, the operator is off somewhere toiling to earn the wherewithal to sustain the mutant and those who share its domicile. The operator's spouse (who, for the sake of convenience, we will call "she") glares malevolently at the mutant, alternately wondering whether to befriend it or simply destroy it.

Suddenly, out of the corner of her eye, she spies a book—a booklet, really—seemingly left carelessly lying next to the mutant. She picks it up. "Hmm," she hmms, "*Starting and Operating a Word Processing Service*. I used to be a pretty good secretary. I wonder. . . ."

It may take a slow reader all of a half-hour to finish this book, but by the time said reader is done, the basics for starting a word-processing business will be learned.

For all its brevity, this little book contains some very useful information about obtaining equipment, setting rates, finding customers, and operating a business at home. It also includes a check list, the original of which was first perpetrated several years ago by the Small Business Administration, that can help the reader decide whether he is suited for the entrepreneurial life.

If the price of the mutant meant sacrificing a fur coat, a new TV, or a

vacation in the Bahamas, maybe the monster can earn back that money.

For \$3.50, it's worth having a look. But don't look in bookstores. *Starting and Operating a Word Processing Service* can only be ordered directly from the publisher.

—Marvin Grosswirth

Words And Pictures

THE COMPLETE BOOK OF WORD PROCESSING AND BUSINESS GRAPHICS

WALTER SIKONOWIZ
MICRO TEXT PUBLICATIONS, INC.
PRENTICE-HALL, INC.
ENGLEWOOD CLIFFS, NJ
212 pp., \$14.95 paperback

The first line on the back cover of this book reads: "This is the first book to describe, in practical terms, the techniques by which word pro-

3 WAYS TO BUY A WORD PROCESSOR

1. **Casually.** Buy the first program whose name you remember.
[After all, they're pretty much the same.]
2. **Carefully.** Study comparison charts and function lists until your eyes glass over and your jaw goes slack--it's called Feature Shock.
[After all that, they still look pretty much the same on paper.]
3. **Confidently.** Walk in to a store and ask to try the **Palantir Word Processor** first. Do look at a couple of others, just so you'll feel good about your choice.
[After all, what's important in a word processor is how it feels. You'll spend a lot of time using it. You might as well enjoy using it.]

We recommend method 3. If the store doesn't carry **Palantir** yet, ask them to call us at Designer Software.

If you insist on method 2, we'll be happy to send you our features list and reviews. They're outstanding.

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CIRCLE 49

BOOK REVIEWS

processing and graphics generation can be combined to produce effective documents and reports." That's what happens when cover-copy writers don't read the book they're promoting. While both word processing and business graphics are indeed thoroughly covered in this informative and comprehensive (if somewhat dry) work, nowhere are the two combined to show how graphs and charts, for example, can be incorporated in a report without cutting and pasting.

In Chapter 1, a scant four paragraphs into the book, Sikonowiz offers his justification for including the two seemingly disparate areas between the same covers: "...it is very likely that the person who needs word processing can also make use of graphics in his or her business." Furthermore, "computer graphics has (sic) a bright future." And finally, both functions often require the same type of hardware; the implication is that if you're going to use a computer to do one, you might as well do the other.

The author then proceeds, in a very businesslike and uncomplicated manner, to explain to the novice what a computer is, how it works, and what its capabilities and limitations are. So much for the first section.

Section II is a fairly complete coverage of what word processing can do and how. Section III, ditto, only this time it's graphics. The types of hardware and software available are all described, and photographs and diagrams are liberally sprinkled throughout the pages to make things clearer still.

The book offers extensive—but by no means complete—lists of manufacturers of computers, peripherals, and software, and concludes with a well-stocked glossary.

But there is also a certain disturbing inconsistency here. Included in the software listings are programs for the Apple, Osborne, and Atari computers, but the manufacturers of those computers are not listed among



the hardware suppliers. Why include Commodore under hardware but not Radio Shack, Non-Linear, or Zenith? Surely this would all seem a little confusing to the novice.

Nevertheless, it is the novice this book will serve best. *The Complete Book of Word Processing and Business Graphics* could serve as an effective antidote to the panic and paranoia likely to greet the announcement that the trusty old Remington is about to be replaced by a computer.

Maybe some secretaries will even be motivated to discover how word processing and graphics can be merged. To do that, however, they'll have to buy another book.

—Marvin Grosswirth

Simplicity And Power

THE UNIX SYSTEM

S.R. BOURNE
ADDISON-WESLEY PUBLISHING
CO., INC.
READING, MA
351 pp., \$16.95

UNIX, the operating system first developed by researchers at Bell Laboratories, has set a standard of simplicity and power for time-shared operating systems. Since it can be adapted to different computers, it has now spread to both mini- and personal computers.

The UNIX System is a comprehensive overview of UNIX System V, the version currently available for license from Western Electric Co., the Bell System's manufacturing arm. Author Steve Bourne is one of several Bell computer scientists who played a major part in extending the original UNIX developed by Ken Thompson and Dennis Ritchie in the early 1970s. He knows the UNIX system inside out, and the book demonstrates that wealth of knowledge.

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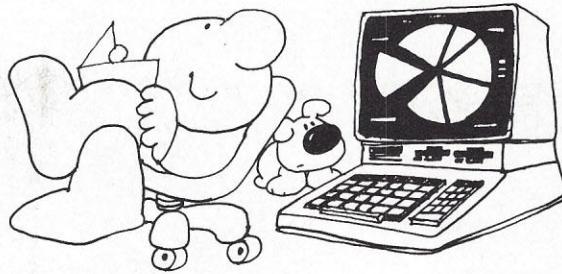
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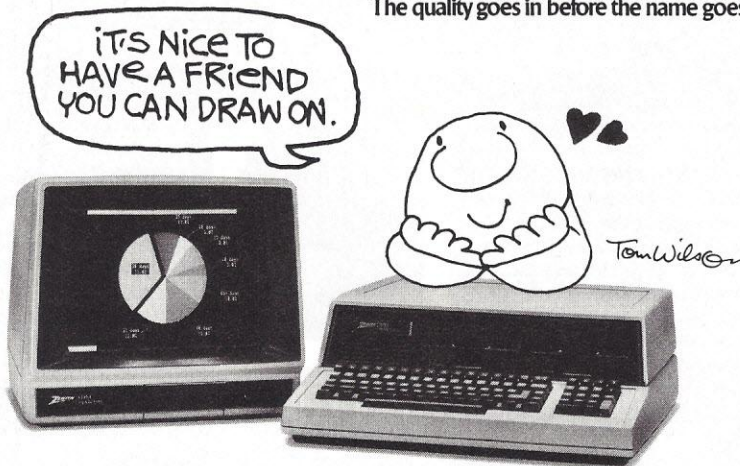
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CIRCLE 54

BOOK REVIEWS

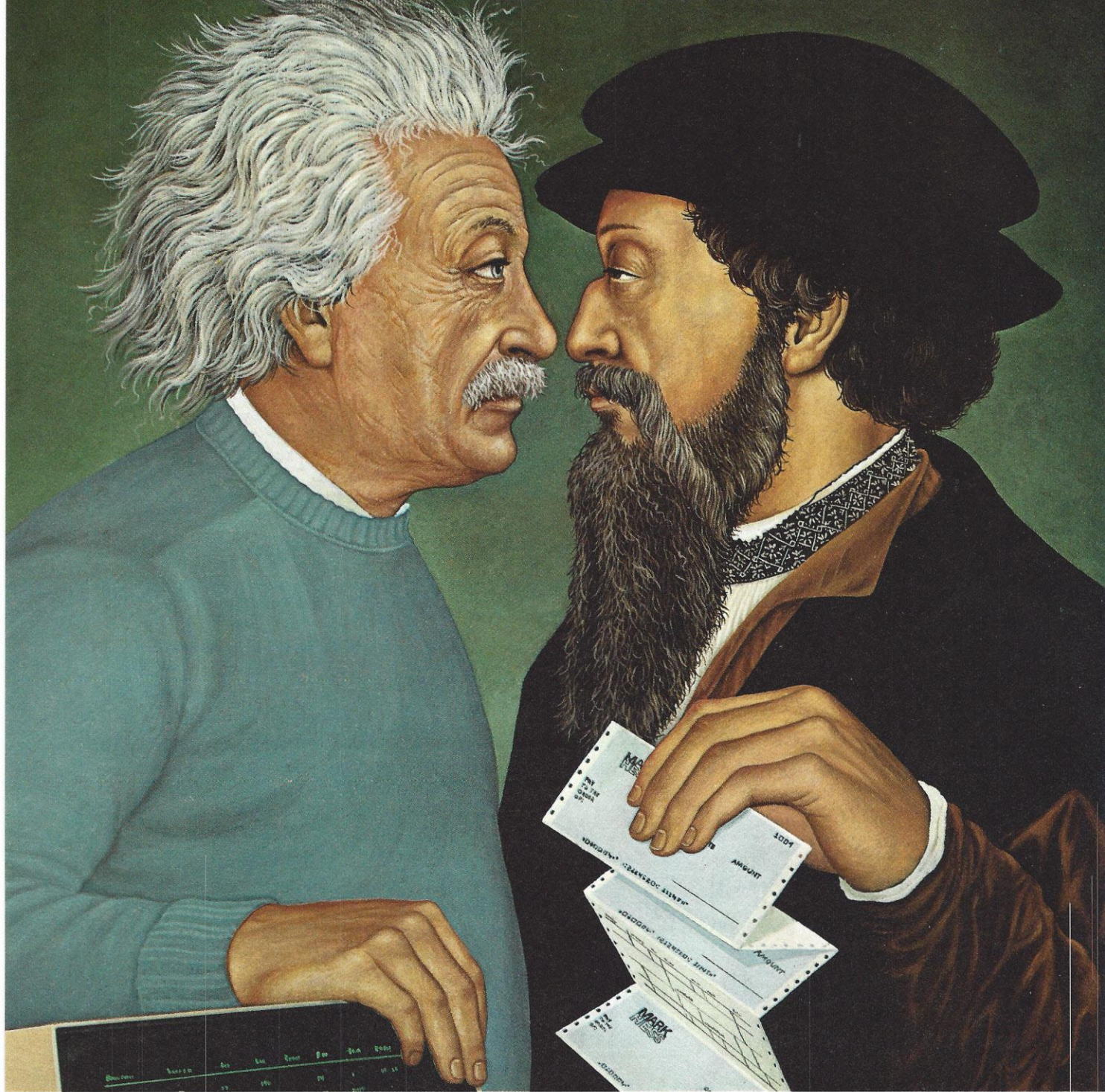
The book is full of useful information—so much information, in fact, that many sections are a tough read unless the reader is familiar with UNIX. Nonetheless, *The UNIX System* has all the elements needed to make it a bible for UNIX users, just as Brian Kernighan and P. J. Plauger's *Software Tools* became the standard text on structured programming for many programming practitioners. For example, almost a third of the book is devoted to a series of valuable reference appendices for the serious programmer. These appendices are easier to use than the foot-high stack of manuals that accompany a UNIX system from Bell.

The main body of the book is a basic tutorial on UNIX, followed by detailed chapters explaining the features that make the system so remarkable. The core of UNIX is a file system that is simplicity itself. The file system is a hierarchy in which directories are treated as files. All input and output devices are also treated like files, and there is a uniform interface for all input and output. The user interface is a command language called the "shell," which executes commands from either a terminal or a file. Files of commands can be executed so users can create their own commands. The simplicity of this system is often a revelation to those brought up on unnecessarily complex IBM operating systems.

UNIX also provides a wide range of tools such as text editors; document formatters including a typesetting program that handles text, mathematics, and tables; electronic mail; compiler construction aids; and a variety of language processors such as C (the language in which UNIX is written), APL, BASIC, FORTRAN, Pascal, and Snobol. The first-time UNIX user is almost overwhelmed by the abundance of tools available.

Bourne is to be congratulated on his attempt to provide a definitive book on UNIX. The text is terse but precise. The book is replete with ex-

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BOOK REVIEWS

amples, many quite elegant and worth some study as exercises in programming. The book is not for casual reading, but rather for working through a little at a time while sitting at a terminal. For personal-computer users interested in serious programming, *The UNIX System* is a valuable reference.

—Jeffrey Bairstow

All In The Family

KIDS AND COMPUTERS: THE PARENTS' MICROCOMPUTER HANDBOOK

EUGENE GALANTER, PH.D
GD/PERIGREE BOOK
PUTNAM PUBLISHING GROUP
NEW YORK, NY
192 pp., \$7.95 paperback.

"The value of computers for children and youth is not in substituting them for teachers nor in using them as audiovisual aids, but in the skills and creativity kids learn by using the machines and by programming."

That is the basic philosophy upon which Dr. Galanter has constructed this book. It is a sound one. It is also a solid foundation on which to build an entire sociological philosophy with respect to people and computers, but that is a discourse which is best reserved for another time. The approach to that philosophy consists of practical, realistic, and useful information, instruction, and exercises, all of which flow from *Kids and Computers* in copious and satisfying quantities.

It could be easy to write a review of this book. Simply look at all the other reviews of all the other guides, handbooks, and introductions to computing. One could almost transfer the table of contents from one book to another, with no significant discernible differences.

What makes this book different, however, is that Galanter, who runs a

computer school in New York City, has diligently martialled all his material so that the reader is constantly aware of the effect and impact of computers on children. For example, he explains how it is that children can absorb the unforgiving, precise, step-by-step logic of programming far better than adults can, and how to take advantage of that reality.

In just a few pages he discourses eloquently and lucidly on how computer literacy develops important skills which have seemingly little relevance to computers. The rest of the book seems to flow naturally from that premise.

Throughout, *Kids and Computers* is practical. The chapters on how to buy a computer are refreshingly different, because they are written from the point of view of someone looking for a true "home" computer, especially for a home with a child in it. The educational and developmental advantages of programming are well covered in chapters that also teach programming. The section on evaluating computer education should prove useful to teachers as well as parents.

Another chapter deals practically and sensibly with safety. In addition to a rundown on the radiation issue, the book settles the detachable vs. non-detachable keyboard controversy, at least as far as kids are concerned. Sensibly, the fewer dangling wires there are, the better—and safer—it is.

Although Galanter is an educator, he is no pedant. His style is readable without being patronizing, and he is able to maintain the delicate balance between an awareness of the reader's ignorance and a respect for the reader's intelligence.

If your home contains both a kid and a computer, *Kids and Computers* should be high on your list of important books to read. Your kid, your computer, and you will all benefit from it.

—Marvin Grosswirth

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CIRCLE 56

GEMS OF WISDOM

Preventing Data Loss

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We were sure we had saved the file, and couldn't understand what we had done wrong.

After discussing the problem, we came up with our error: While trying to load the file, we inadvertently saved it. This meant we saved a blank screen over our data file. The computer never indicated this error.

Our computer dealer suggested a simple solution: Lock all data files. This is something most users overlook.

Beverly A. Oscar
OFFICE MANAGER
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This Gem of Wisdom wins \$25 for Beverly Oscar. If you have an anecdote, a tip, or secret to share, send it (up to 250 words) to Gems of Wisdom Editor, Personal Computing, 50 Essex St., Rochelle Park, N.J. 07662.

BOOK REVIEWS

How To Recycle A Book

DOING BUSINESS WITH SUPERCALC

STANLEY R. TROST
SYBEX, INC.
BERKELEY, CA
248 pp., \$12.95

This book is an excellent example of recycling in the computer publishing business. On page 155 of the March issue of *Personal Computing*, I reviewed a book by Stanley Trost entitled *Doing Business with VisiCalc*. When *Doing Business with SuperCalc* arrived in my mailbox, I reached for its sister publication and did a rapid comparison. Substitute the word SuperCalc for VisiCalc and the two books are virtually identical—testimony, I suppose, to the value of a word processor. Would that I could simply recycle my review of the earlier book!

If you happen to have a copy of the March issue, you might like to scan the first review and use your mental word processor to substitute SuperCalc wherever appropriate. If you don't have the March issue, let me say that just as I recommend Trost's first book to VisiCalc users, so, too, I think the SuperCalc version is well worth buying and using. This is one case in which recycling previously published information has some merit.

The author has rewritten all the routines and spreadsheet examples to conform to SuperCalc usage, and, according to the book's introduction, has tested the examples on an IBM Personal Computer and an Osborne 1. The results, not surprisingly, are almost identical to those in the VisiCalc book. The examples cover simple record keeping, portfolio analysis, real estate investment, and even income tax schedule preparation. The examples are carefully explained and the text and figures are easy to follow.

If you are a SuperCalc user, *Doing Business with SuperCalc* ought to be on your bookshelf. You'll find that the routines listed are an excellent base for developing your own set of business programs using SuperCalc. —Jeffrey Bairstow

Handy is as handy does

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About a year ago, Alfred Publishing Co., Inc. introduced a set of six booklets intended to serve as quick reference guides. It has now introduced another half-dozen. *How to Buy a Personal Computer* is something of a straddler. It was included in the original batch, but is consid-

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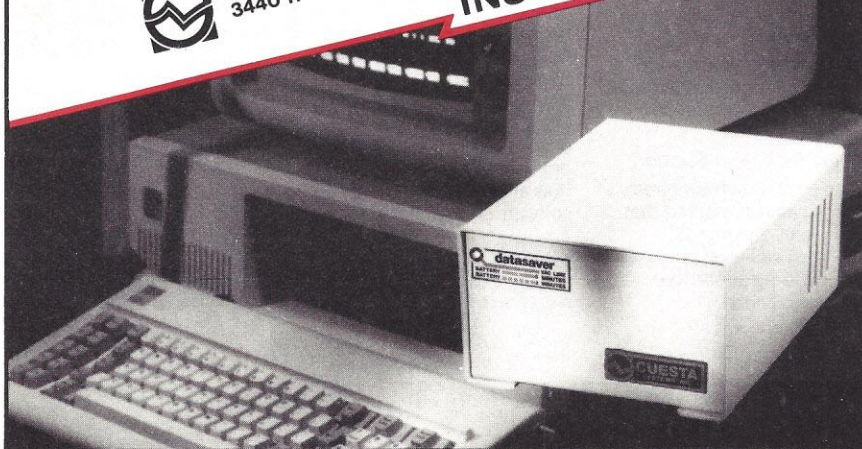
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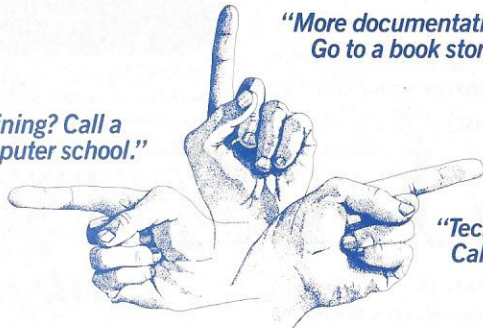
CIRCLE 58

COMING IN FUTURE ISSUES

Expanding The Computer Curriculum

When a New Hampshire school board passed a bill establishing a computer literacy requirement for its students, it took an important step forward in preparing young people for the working world. Our August issue will feature a report on the program and its implementation.

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"Technical support?
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BOOK REVIEWS

ered new because it has been updated—up to a point. Although it claims to be current as of October 1982, it still refers to the Kaypro II as the Kaycomp.

The books are certainly handy physically. They measure 5½ by 11 inches, and appear to be designed to withstand frequent use and even occasional abuse.

Actually, they're handy in terms of content, too. Each book is either 48 or 64 pages long, and anyone who has studied the computer book industry can't help but wonder how Alfred can manage to pack into these publications the same information that fills at least 200 pages in other books.

Well, as a matter of fact, it can't. For one thing, there's not much romance in the Alfred books, despite the fact that there's plenty of romance in writing, reading, and learning about computers. And while all the books contain instructions of varying kinds, they are a little short on complexity and sophistication—which, of course, is exactly what one should expect from a guide. These are not tutorials and don't pretend to be. The cover of *Understanding Data Base Management* carries a phrase that best describes the entire series: "An easy overview . . ."

A busy executive or professional who feels the need for a crash course in the subjects covered by the *Handy Guides* would do well to pick up a few on the way to the commuter train or the airport. By the time the trip is over, he will have enough information to at least discuss the subject intelligently and to make a sensible decision about whether to pursue it in depth.

Other previously published titles include *Understanding BASIC*, *Understanding COBOL*, *Understanding Pascal*, *Understanding FORTRAN* (all meant for people with at least some background in programming), and *Understanding Artificial Intelligence*.

—Marvin Grosswirth

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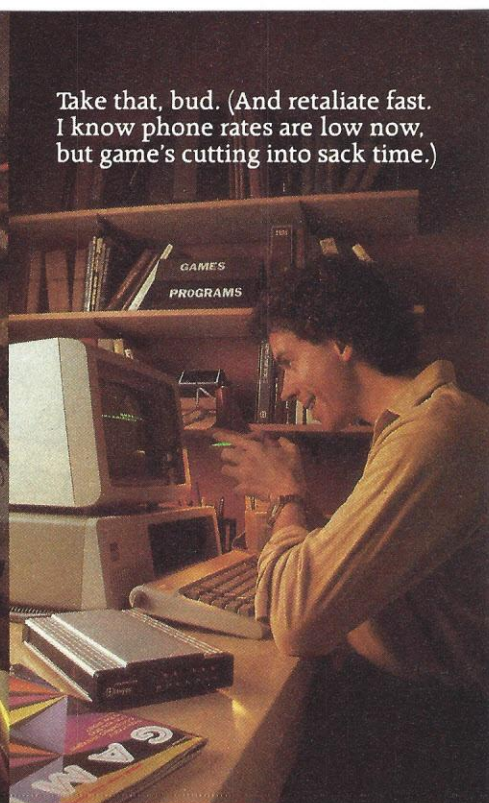
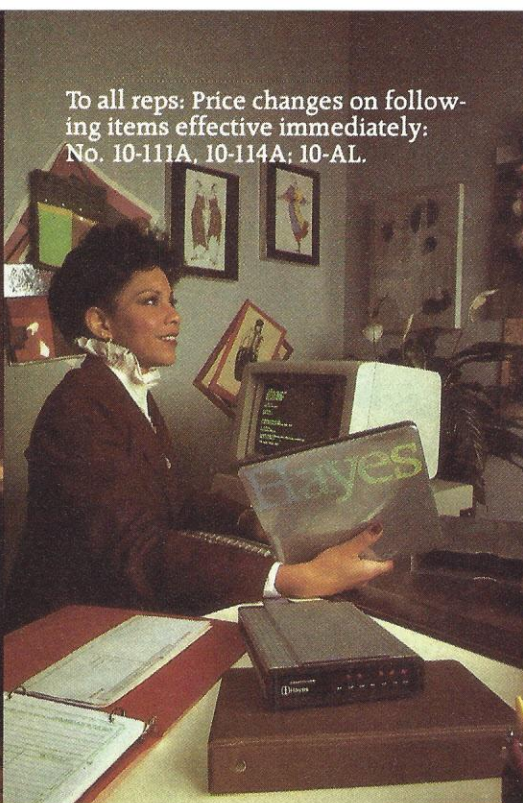
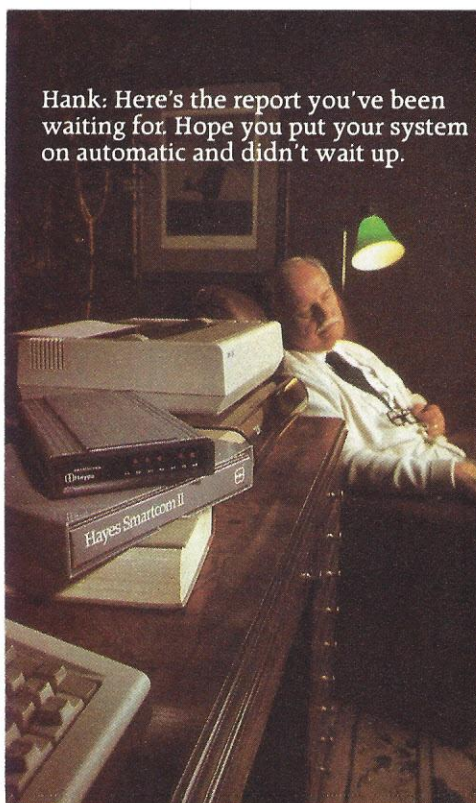
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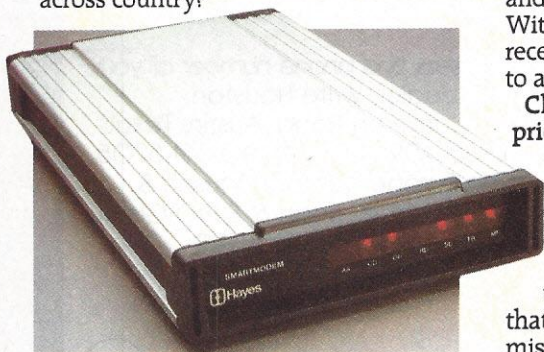
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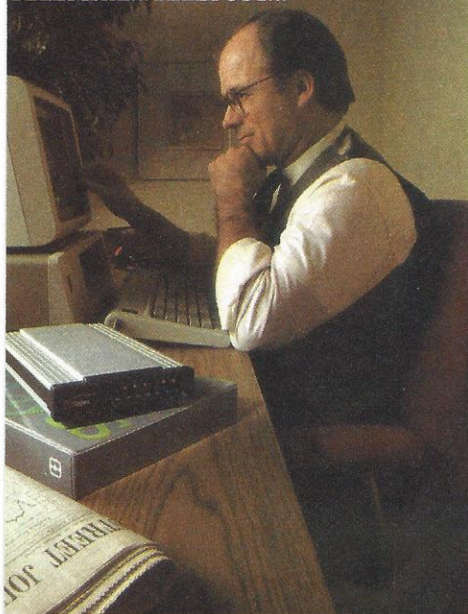
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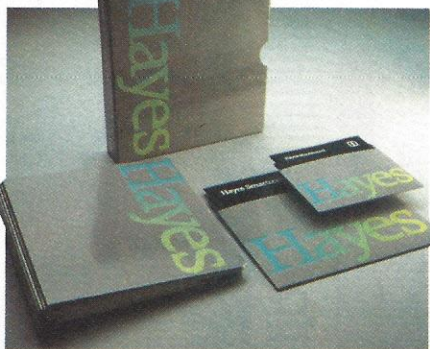
CIRCLE 62

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BOOK REVIEWS

Computer Literacy Vs. English Literacy

THE ABCS OF MICROCOMPUTERS: A COMPUTER LITERACY PRIMER

LINDA GAIL CHRISTIE AND
JESS W. CURRY, JR.
PRENTICE-HALL, INC.
ENGLEWOOD CLIFFS, NJ
218 pp., \$7.95 paperback

On page 55 of this book—ironically, in the section on word processing—is the following: “A business user, home computer user, or hobbyist who has moderate wp demands . . .” Hobbyist? Hobby, hobbyist, hobbyist?

Undaunted, the intrepid reviewer has a stiff drink, and continues to flip through the pages. Page 93: “The primary drawback to (sic) a TV receiver is that the letters, numbers, and special characters are not as clear as on a cathode ray tube (CRT).” Intrepid reviewer sighs, lays down book, has another stiff drink, and with trembling hands reaches for the *Oxford American Dictionary*, where he finds: “cathode ray tube—a vacuum tube, for example, a television picture tube . . .”

Some people may not regard these lapses as serious (although I consider “hobbyist” unforgivable in a book which touts electronic writing and editing), but it is difficult to argue against the notion that they suggest a certain carelessness that may prevail throughout the book, and an inattention to detail of which the reader for whom this book is intended is unlikely to be aware. Abominations like “hobbyist” and the suggestion that a television receiver is not a CRT go a long way toward undermining the credibility of the entire book.

Still, if you're willing to risk that, then *The ABCs of Microcomputers* is about as good as most other books of its genre. There isn't much that's left out—except for careful editing—and hardware, software, applications,

and the basics about computers are well covered. Considerable space is devoted to a section called “101 Home Computer Applications” which, in fact, lists 29; and another, called “101 Business Applications,” lists 32. The rest of the 101 are sort of implied in the specific listings.

Under “Educational Applications” the authors advise: “The three r's can be drilled on microcomputers. Reading, spelling, writing and arithmetic lend themselves well to computer instruction.” Well, that may be true for kids, but try convincing some of those hobbyists out there.

—Marvin Grosswirth

Basic Pointers

COMPUTERS FOR SMALL BUSINESS

GARY BENCAR
LA CUMBRE PUBLISHING CO.
SANTA BARBARA, CA
132 pp., \$9.95

Although some books are fine examples of information recycled from other works, *Computers for Small Business* is more of a regurgitation of old and tired ideas. Bencar's book is a rehash of fundamentals and basic pointers which have appeared in a score of similar guides for the first-time computer buyer.

In less than 100 pages of text (the rest of the pages include supplier addresses and a glossary), Bencar attempts to cover everything from the law of diminishing returns to impact expense (the time an employee spends doing the books instead of earning money). His final piece of advice is to maintain your hardware and have it cleaned regularly. Does a businessman need a book to get that kind of tip? In addition, scattered throughout the book are photos from manufacturers' press kits which have nothing to do with the text. For example, a photo of a Xerox Star workstation appears in a section on con-

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BOOK REVIEWS

figuration, but systems of the Star variety are never described in the text.

As if the poor quality of the content were not enough, the book was composed on a typewriter, and the typescript looks as if it has been reproduced by a local copying service. The book looks like a disaster, and very nearly is.

—Jeffrey Bairstow

What to do with your new computer

HOW TO MANAGE YOUR SMALL COMPUTER . . . WITHOUT FRUSTRATION

HILLEL SEGAL AND JESSE BERST
PRENTICE-HALL, INC.
ENGLEWOOD CLIFFS, NJ
256 pp., \$14.95 paperback,
\$22.95 hardbound

This book is the second in a series of guides developed by the founder of the Association of Computer Users. Not unnaturally, the book assumes that you have read the first guide to buying a small computer and are now interested in living with the purchase. As with the first guide, the advice given in *How to Manage Your Small Computer...* is safe and solid. There are no surprises in this book, but there are some serious weaknesses that reduce its value to the small businessman.

Worksheets are scattered throughout the book, as are lists of vendors and boxes of helpful hints. The vendor lists are eclectic, to say the least. A listing of forms suppliers includes Datapro Research, a market research and equipment review publisher. Other lists have equally surprising inclusions. In fact, the whole book gives the impression of being thrown together in a hurry with little research. This book may end up causing more frustration than it eases.

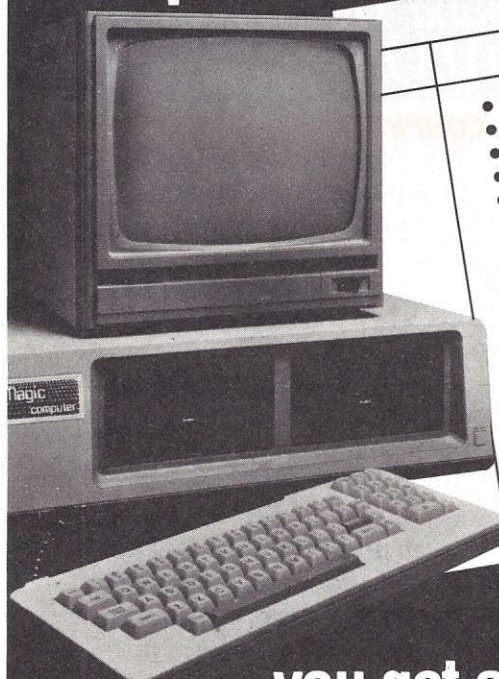
—Jeffrey Bairstow

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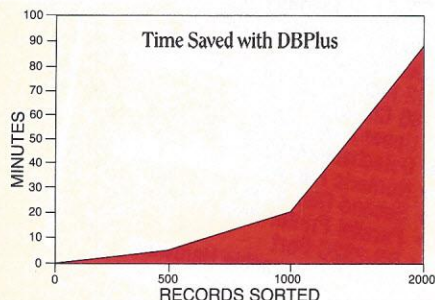
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CIRCLE 66

BOOK REVIEWS

True Hands-On Experience

HOW TO USE: HEATH/ZENITH COMPUTERS

HAL GLATZER
S-A DESIGN BOOKS, INC.
BREA, CA
144 pp., \$19.95

In the fast-moving computer business, a company must be quick on its feet to keep up with the competition, especially if the firm was an industry pioneer. One pioneer which hasn't kept pace is the Heath Company, which developed the Heath H-8 machine in 1977.

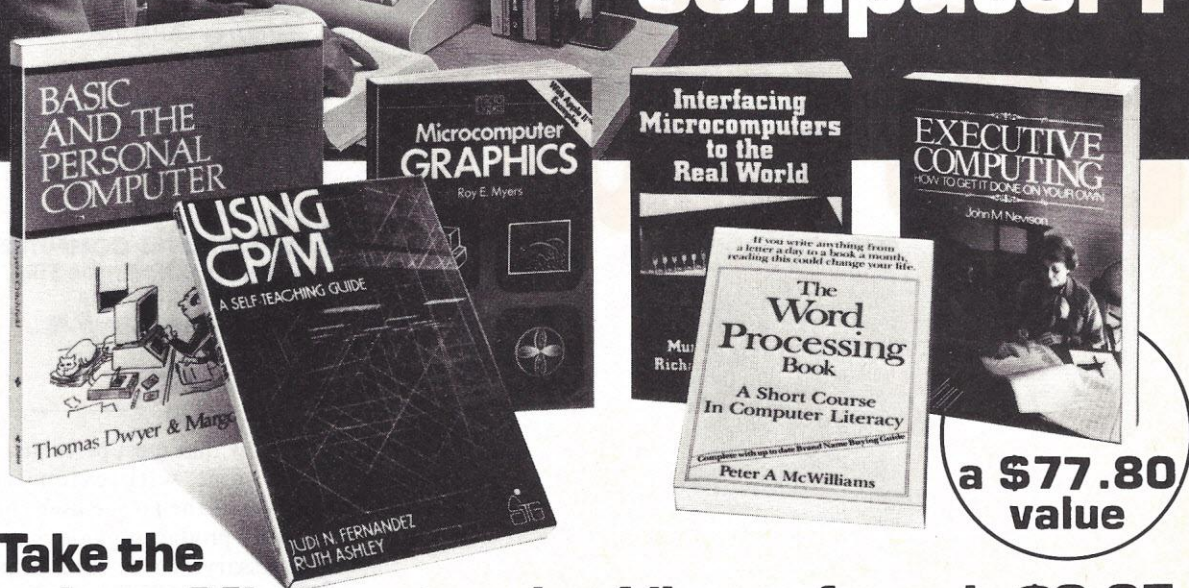
Heath's problem is that its products appear to be aimed at dedicated electronics enthusiasts. Other companies have taken the retail personal-computer market by storm while Heath's products have gone largely unnoticed. Even the 1979 acquisition of the Heath Company by Zenith Data Systems, a division of Zenith Radio Corp., the radio and television supplier, failed to give Heath products the wider market they deserve. In fact, the latest Zenith/Heath computer, the Z100 or H-100, a dual 16-bit/8-bit machine, is comparable to the IBM Personal Computer.

Glatzer's book will do little to change Heath's fortunes. The overall impression created by this book is that the Heath and its look-alike Zenith computers are still most likely to appeal most to users who like to tinker with electronics. The book looks like a hobbyist's manual. It contains photos of the insides of the computers and has step-by-step photo sequences showing how to install a particular electronic widget.

The book is a thinly disguised sales promotion for Heath/Zenith products. However, Heathkit builders, especially those who constructed the earlier H-89 or the H-100, will find valuable advice in the book, particularly on non-Heath accessories and



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J.N. Fernandez and R. Ashley. A complete introduction to the CP/M ("Control Program") software package used on many advanced microcomputers. **Publisher's Price \$14.95**

3. MICROCOMPUTER GRAPHICS.

Roy E. Myers. Provides the essential mathematics and programming techniques you will need for computer graphics applications in BASIC, and many other topics. **Publisher's Price \$12.45**

4. INTERFACING MICROCOMPUTERS TO THE REAL WORLD.

Murray Sargent III and Richard L. Shoemaker. The complete guide for computerizing your home, office, or laboratory. Tables, charts, and displays show you how to handle microcomputer software and operating systems. Examples feature the Z-80 microprocessor. **Publisher's Price \$15.55**

5. THE WORD PROCESSING BOOK: A Short Course in Computer Literacy.

Peter A. McWilliams. You'll see how to save up to \$15,000 by buying a small computer with word processing capacities. Includes a brand name buying guide. **Publisher's Price \$9.95**

6. EXECUTIVE COMPUTING.

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CIRCLE 68

BOOK REVIEWS

applications software. So if you're contemplating a Heathkit purchase, read this book before plunking down your cash.

—Jeffrey Bairstow

Everything you want to know about your PET

PET PERSONAL COMPUTER GUIDE

ADAM OSBORNE, JIM STRASMA,
AND ELLEN STRASMA

OSBORNE/MCGRAW-HILL

BERKELEY, CA

544 pp., \$15

Now that most personal computers come with extensive guides aimed at the novice user, an independently produced guide may seem unnecessary. To be sure, a user of the Commodore PET series of computers could manage without the *PET Personal Computer Guide*, but it is a helpful companion to the computer manual. This is an excellent guide for the user who has some experience with the PET and wants to know more.

The book was developed from an earlier guide to PET and CBM computers from the same publisher. The authors clearly have had several years of experience with the Commodore series of computers and, what's more, know how to put that knowledge into readable form. This edition covers the PET models 4032, 4016, and their forebears; the 4040 and 2031 disk drives; and the 4022 printer. Also covered are the 8010 modem, the 4010 voice synthesizer, the machine-language monitor, and ways to update earlier PET models.

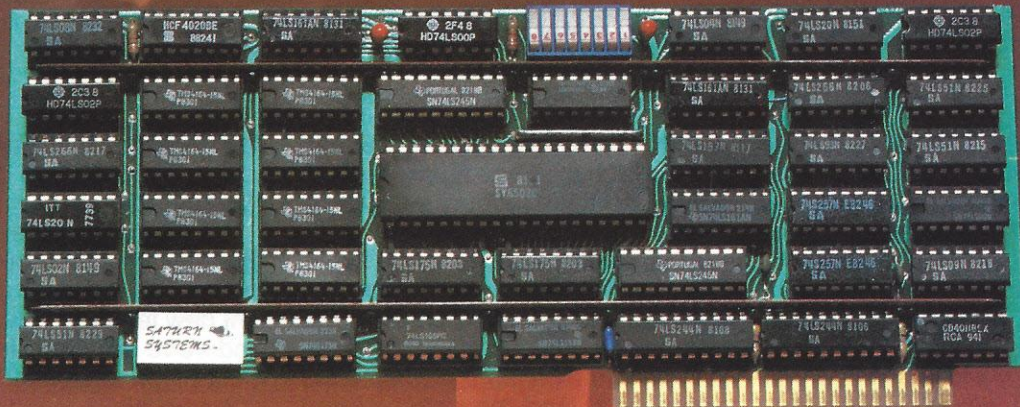
This well-written book contains many useful program listings, and most of the programs are available on disk from PET user groups or from the authors. The book is crammed with useful information, and should be used as a reference.

—Jeffrey Bairstow



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CIRCLE 69

It took hundreds of years to build the world's most advanced spreadsheet.

Way back in 1534, a Venetian scholar wrote a text that standardized the techniques of modern bookkeeping. And up till 1979, there weren't a lot of real improvements in the way people did spreadsheets. You still had to enter all your figures by hand. Run all the totals yourself. And when you had to make a few changes, you had to run the totals all over again.

Then along came a program that let you create spreadsheets on a personal computer. Without touching a pencil. Or adding anything by hand. Best of all, this new program gave you the freedom to look at your balance sheet a dozen different ways if

you felt like it. Because all you had to do was change one figure, and the computer would refigure everything else for you. Automatically.

Like most breakthrough ideas though, this original spreadsheet program had a few things that definitely needed improvement. For instance, all the columns had to be the same width. And the entire system took about 20 hours to learn.

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1981

1534

1540 Adi ultimo Feb

294	Pro et danno // A donu arii, per da tratto in resto, per saldo di quello ff
295	Pro et danno // A Spefe de uiuer di spefe fatte, come in esse appar, per saldo 154 ff 20 ff 14
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297	Pro et danno // A Spefe diuerse per l'anno presente, come in esse appar, per 399 ff 12 ff
298	Pro et danno // A Spefe de salariadi piu spefe fatte l'anno presente, come in per saldo di quelle ff 48 ff 12 ff
299	Pro de zeccha in monte // A Pro et d lita seguida, come in quello appar, per 150 ff
300	Pro et danno // A Cauedal de mi Alui per utilita seguida de l'anno 1540, ff

1979

STATEMENT			
	JAN	FEB	MAR
SALES	1000	1100	121
COST	300	330	363
GROSS	700	770	847
R & D	160	176	194
MARKETING	200	224	251
ADMIN.	140	151	163
TOTAL	500	551	608
INCOME	200	219	239
TAXES	80	88	96
NET	120	131	143

INCOME STATEMENT	
1	NET SALES
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3	COST OF GOODS SOLD
4	
5	GROSS PROFIT
6	
7	RESEARCH & DEVELOPMENT
8	MARKETING
9	ADMINISTRATIVE
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11	TOTAL OPERATING EXPENSES
12	
13	INCOME BEFORE TAXES
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15	INCOME TAXES
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17	NET INCOME
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So. If you've always thought there had to be a better way to do your spreadsheets, stop by your closest computer store. And take a good look at SuperCalc². After just 10 minutes, you won't want to do one more spreadsheet the old way.

1983

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Percentages.

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Payroll Start Date	4/ 1/83	Fica	6.700%			
Days this period	15	SDI	.8%			
Recalculate YTD Y/N ?	N	User-set dec				
Emp#	Employee name	Status	Gross Salary	Total Deduct	Net Pay	YTD Gross
34	Adams	M	\$1,100.00 (\$82.50)	\$1,017.50	\$6,200.00	
49	Bequette	S	\$750.00 (\$56.25)	\$693.75	\$5,250.00	
84	Johnson	S	\$850.00 (\$63.75)	\$786.25	\$5,950.00	
92	Jones	M	\$900.00 (\$67.50)	\$832.50	\$6,300.00	
12	Samson	S	\$560.00 (\$42.00)	\$518.00	\$3,920.00	
19	Santos	M	\$650.00 (\$48.75)	\$601.25	\$4,550.00	
45	Smith	S	\$700.00 (\$52.50)	\$647.50	\$4,900.00	
Total # employees		7	Floating \$ signs.		Embedde	
Total Gross Salaries (100's)			\$55.1	Negative numbers in ().		
Total Deductions (100's)			\$-4.1			
Total Net Pay (100's)			\$51.0			

User-set decimal places.

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PROFESSIONAL/ MANAGERIAL


BUYING A SECOND COMPUTER (continued from page 61)

Keep in mind, by the way, that two computers under one roof can share some peripherals. Two writers, for example, might each have a computer with a low-cost dot-matrix printer, and then share a single letter-quality printer, since demand for the better printer is bound to be only occasional. Equally, instead of buying two low-speed modems, it might be more cost-effective in the long run to purchase one 1200 baud modem, which is relatively easy to transfer between computers.

Necessity expands

Having set out to explain the surprising results of our readership survey, we've ended up with some fairly fundamental conclusions about the nature of computing.

Once you learn to use a computer, two things happen. The first is that the computer, initially perhaps an experiment, becomes a necessity. Secondly, there is some curious process of osmosis at the keyboard that seems to generate new ideas for using the machine—"what else?" applications which soon become necessities. Sooner or later, there are more demands on the computer than a single machine can fill—either in terms of special applications (better graphics, more memory,) or simply the number of people clamoring to use it (me next).

In retrospect, the abrupt appearance of the second computer phenomenon—so early in the life of the personal computer itself—shouldn't be much of a surprise. And if you, gentle reader, having only recently purchased your first computer, have lately felt some urges to buy a second—but have fought them off as pure fancy—reconsider. What may seem like rampant consumerism on the surface may actually be yet additional testimony to the power and ubiquity of the personal computer. 

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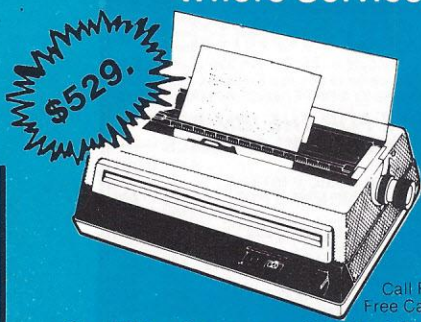
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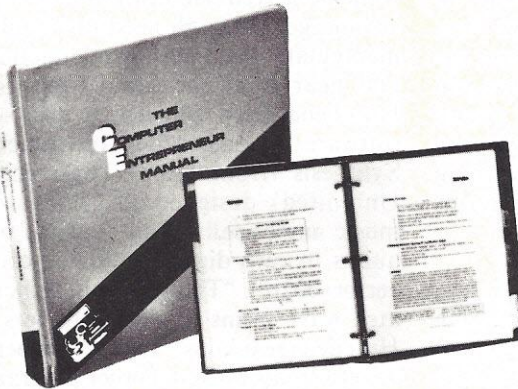
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COMPUTERIZED MUSIC*(continued from page 77)*

to the digital oscillators. These values are defined as Attack, Decay, Sustain, and Release. When a piano key is struck, for example, the attack—or how fast the note comes on—is relatively fast, and the decay is slow, meaning the amplitude of the note diminishes gradually. There is practically no sustain—that is, the note does not “hold” at a constant value. An organ, by contrast, will have a very high sustaining value, and almost no decay. Each musical voice then will have its own particular “wrap.” Says Hutcheon: “It gives you a lot more flexibility in controlling the voices.” By entering slightly different “envelope” and waveform values on each oscillator—two oscillators make up a musical “voice” (this is done to enrich the sound, much the way two strings on a piano make up one musical key)—“I can do very interesting things,” Hutcheon says. He can not only alter the size of the waveform but also “make the sound transfer from one speaker to the other.” This is known to experts as spatial modulation. It’s all part of the challenge of regulating the data—the envelope, the wave form, and the musical score.

There is much data to generate, Hutcheon admits, that as yet most home synthesizing systems—be they digital or analog—cannot do synchronously, in real time. “The software is way behind the hardware,” Kohler adds. “The interface between composer and hardware is so individual no one could write a program that would relate to each individual composer.”

For now, most composers using either a computer keyboard that defines pitch and duration, or a piano or organ-like keyboard which attaches to the personal computer as a peripheral must experiment and create their “musical voices” in advance of the actual performance. This is done through software packages known as

“instrument definers,” which allow the user, depending on the type of program, to define a wave form and its overtones either by manipulating that form on the monitor or by specifying numbers in a bar graph. In addition, some programs allow the composer to define the “envelope” numerically, as the music is being played (the Soundchaser system from Passport Designs is an example). In general, though, creating instrumental voices is still a difficult job. Says Kohler: “No one has yet come up with a satisfactory type of wave form definition. It’s only been a recent capability that you can hear what you can see. People don’t have visual analogs to what they hear. Drawing the wave form takes a lot of learning to know what different wave forms make different sounds.”

Choosing the system

Kohler, for one, sticks to composing on a Hammond organ. Although he is very adept at the synthesizer, and has composed many works Hutcheon himself has recorded, he says the lure of the musical tinkering could take up all his time. Hutcheon, though, has responded to the challenge of synthesis in some very inventive ways: first, by choosing the right hardware and peripherals, and second, by tinkering with some of his own software.

“Even before I bought the Apple, I looked at all the computer accessories for music that I could buy,” he says. His research began as early as 1980, when he started scouting around for a system. He considered buying an S-100 bus type computer, he says, but it had “nowhere near the software or the peripherals” of an Apple. A brochure from Mountain Computer introducing its first MusicSystem convinced him to take the plunge. It was an integrated system, “a real bargain,” he says, for \$500 (a price that has since dropped to \$395), consisting of a digital synthesizer board patch cables, and software.

That system, though, was not de-

signed for an electronic keyboard—Hutcheon had to use his regular Apple board to compose and enter all his musical data. A year later, though, he bought a four-octave Soundchaser keyboard from Passport Designs, which also included a four-track polyphonic synthesizer, interface cards, and software. This enabled him to compose and play on a more familiar interface, he says, and made it possible to manipulate the sound “envelope” of all his musical voices while he played. He saw this as a real advantage, although he still couldn’t manipulate the wave form function and hear it at the same time. So Hutcheon tried something else—a software package called Instrument Synthesis (from Micro Technology Unlimited) designed to synthesize music numerically. This package requires its own digital-to-analog converter board. “The program generated wave forms through numbers,” Hutcheon explains. Those numbers were stored, and yet another program “defined the score (by entering numbers)” also, he says. “The music it can produce is very amazing,” and the price was inexpensive, he adds. But it lacked a usable scoring interface.

New challenges

So now he is onto new things. His most challenging project right now is designing what he calls MusiCalc, a spreadsheet program which, “instead of producing a table of numbers, will produce music,” he says. This is a way of managing the batches of complex musical data generated by all the other programs. Eventually he hopes it will allow him to “define” the musical event—any increment of music he chooses—and store it as a series of values for wave form, envelope, volume, etc., on a mathematical spreadsheet loaded onto diskettes. The format would be layered, he says; for example, the bottom layer would define the waveform, the next cell the note, and on up.

The interface between composer and hardware is very individual.

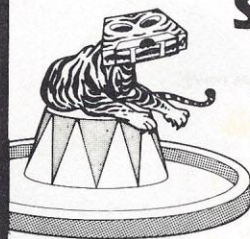
"I haven't found any hardware problems along the way," Hutcheon concludes, and software bugs have been minimal. They've been mostly constituted as limitations: Mountain software, for instance, only allows him to play about three-minutes of composition at one time. In the Mountain MusicSystem, a composer can't change voices in the middle of the piece. "All the voices must start from the beginning," Hutcheon says, even though a composer can eliminate the apparent presence of a certain instrument, such as a flute, for example, by scoring with musical "rests." Hutcheon found that the Soundchaser digital filter, which filters out high harmonics, also produces some distortion. But overall, he believes his more than \$3000 investment (including roughly \$1500 for the Apple and \$1200 for the Soundchaser, in addition to the Mountain MusicSystem) was well worth it.

But Hutcheon is quick to caution that his is the satisfaction of an experienced musician. Systems as advanced as his, he believes, are most useful for people who really have interest and expertise in the field, though many manufacturers are indeed touting extremely sophisticated synthesizers as strong teaching tools with tutorial software and "canned" music. Hutcheon, though, believes an inexperienced user should definitely investigate the "simpler add-on" systems for Apple and other personal computers before making a larger investment.

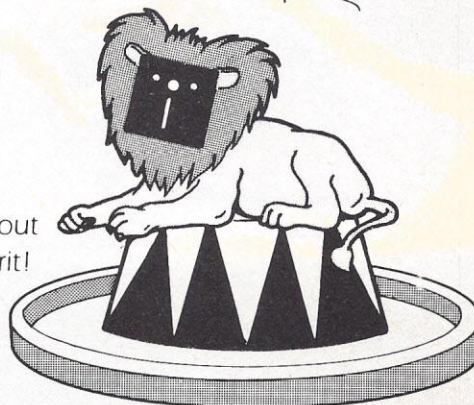
Still, for those ready for the challenge, Hutcheon's energy and commitment to his home computer music system should serve as a model. Not only is he readying two major synthesized quartets—his "Carlaluna," and another, called "Product 19"—but he is still experimenting with those elusive voices he hears.

"If I had my choice, I'd be a music producer," Hutcheon says. "But working with the synthesizer fulfills my fantasy."

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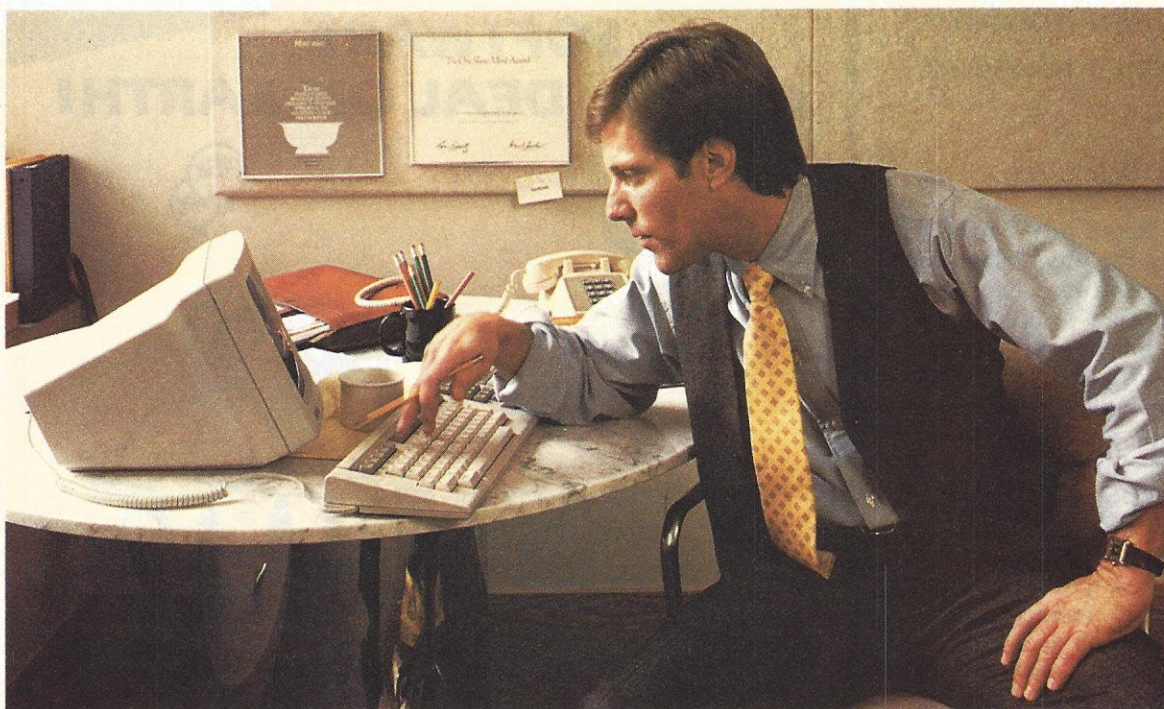
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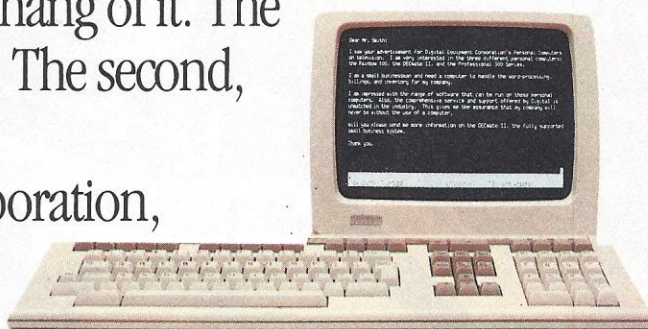
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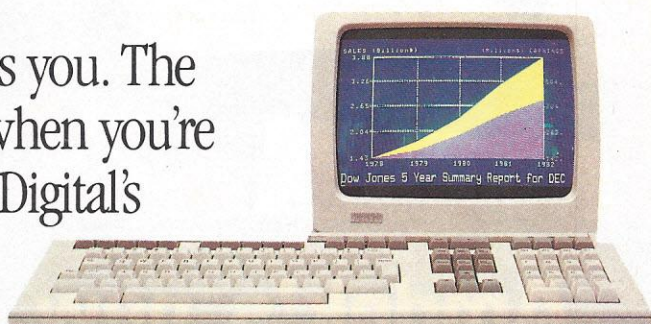
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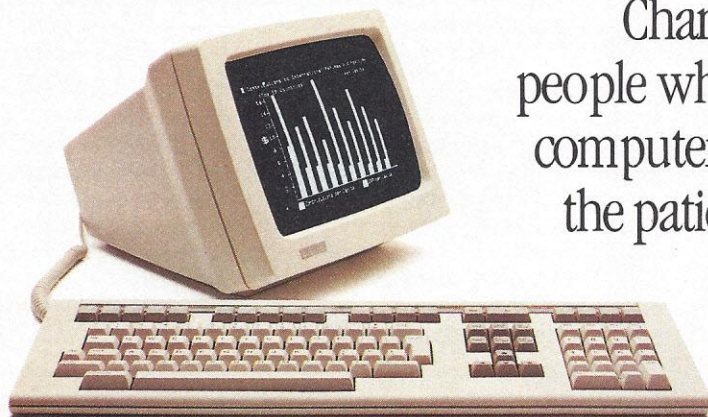
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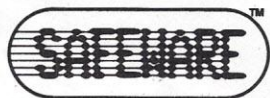
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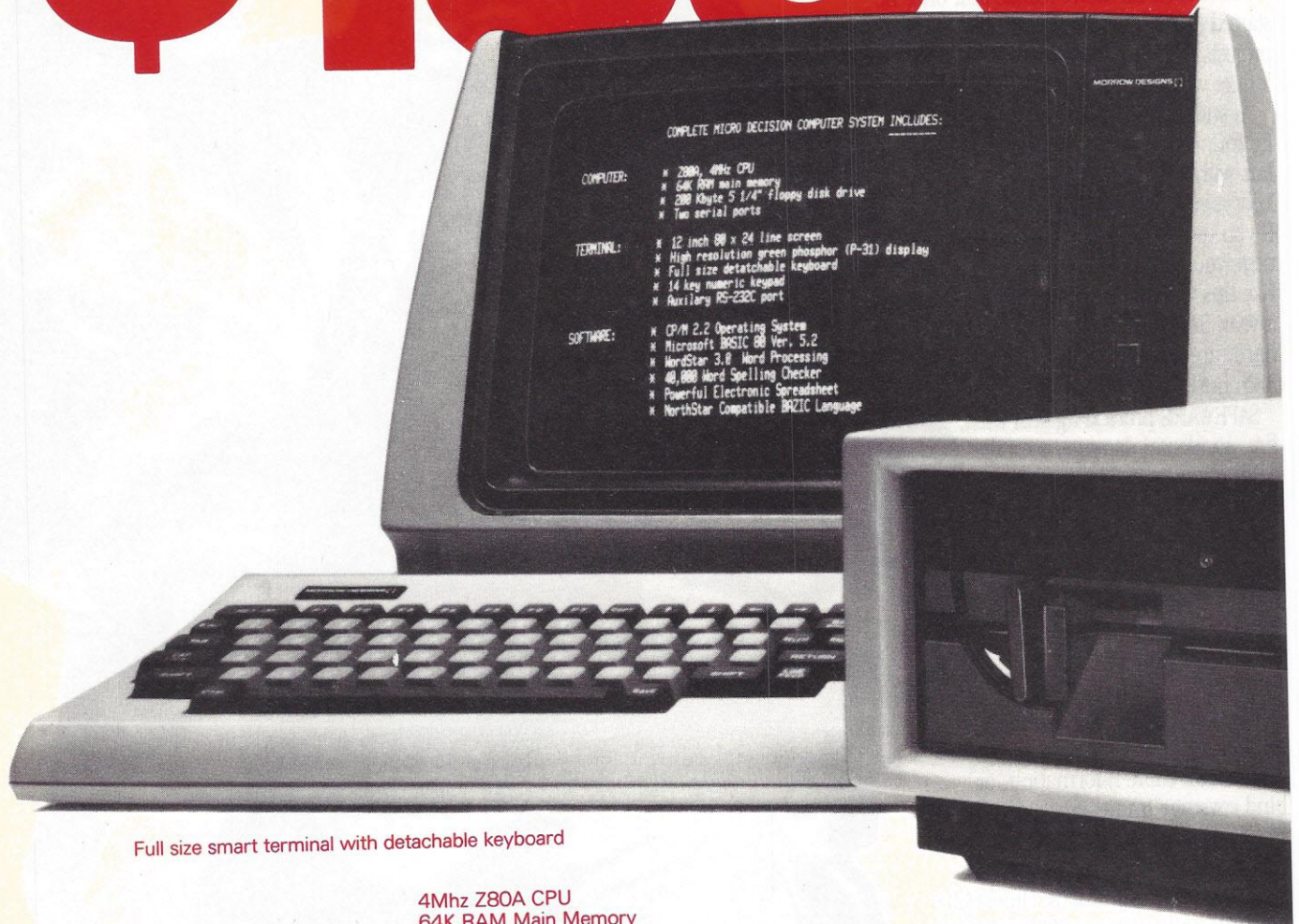
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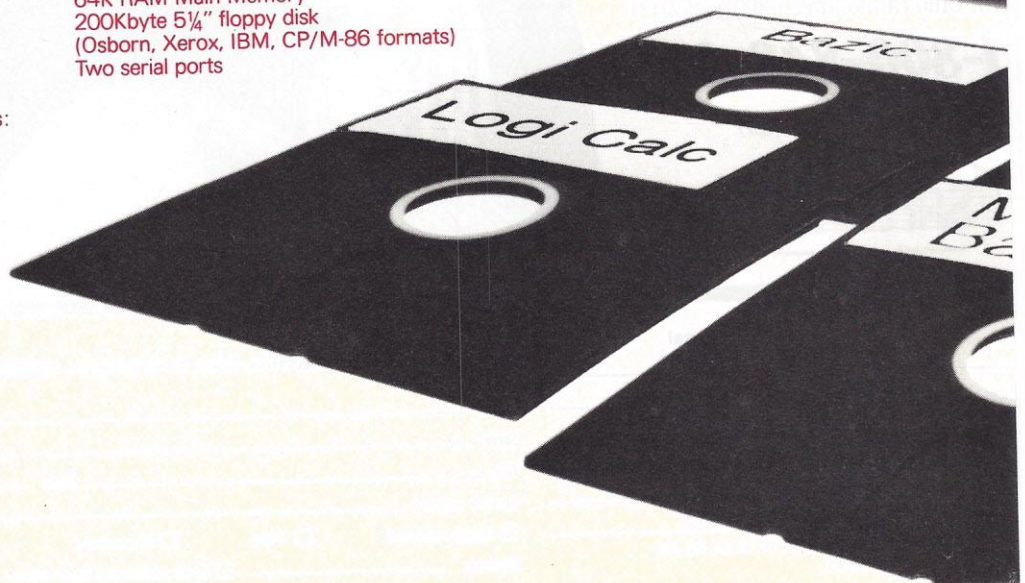
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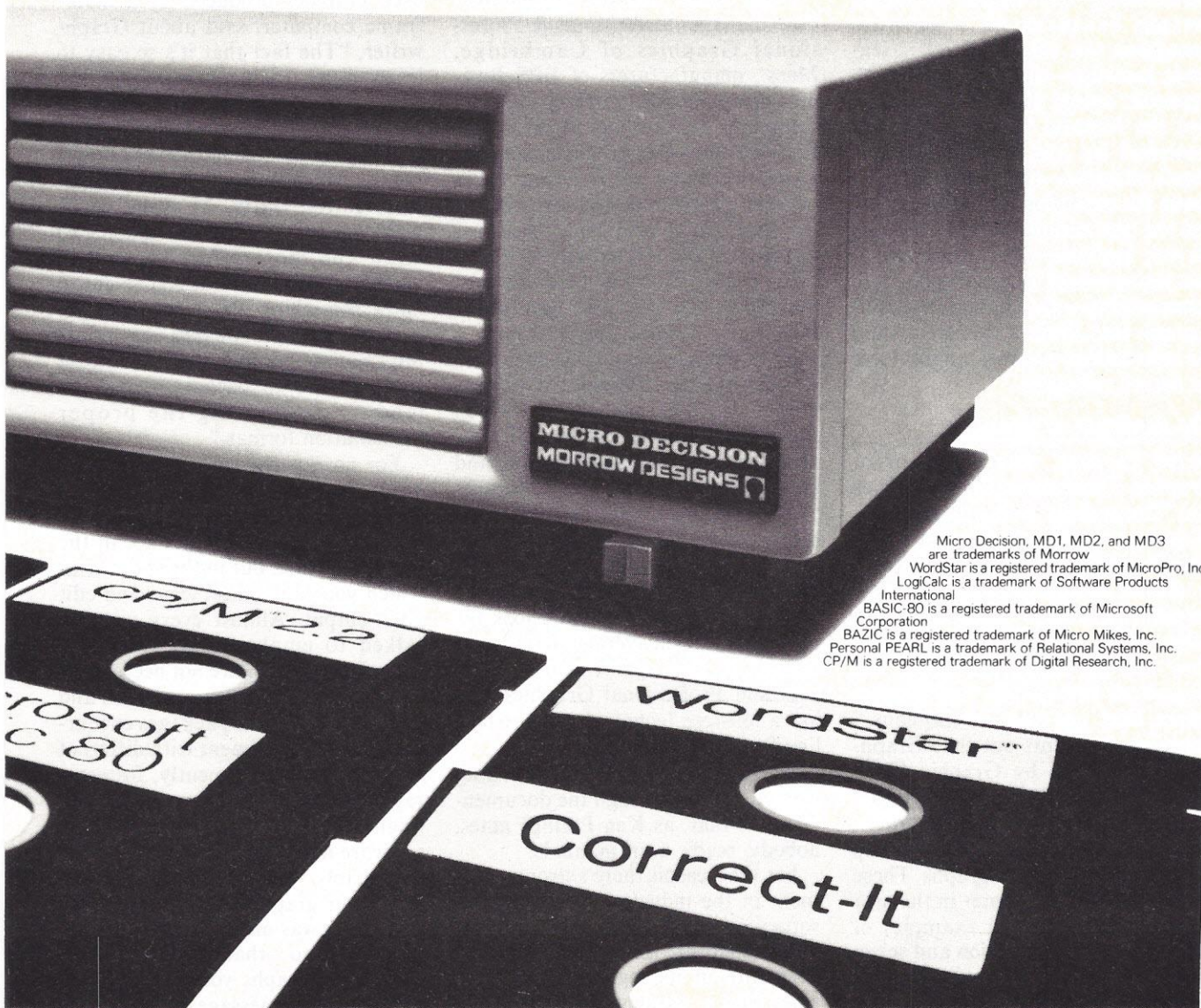
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PRESENTATION GRAPHICS

(continued from page 119)

graphs from computer software. Three of these are specifically related to the proper use of color: detectability—the ability to judge the presence or absence of a feature; discriminability—the ability to differentiate between chart elements; and compatibility—the degree to which a graphic fits established modes of information processing, such as the color red signifying a deficit or danger. The other points he stressed are: redundancy—the degree to which certain features of a graphic strengthen the effects of other features; meaning—the extent to which a graphic causes the viewer to interpret the features of the graphic as intended by the communicator; standardization—the consistency between the coding or form of a display and the type of information to be displayed; legibility—the clearness of text incorporated in the graphic; and memorability—the characteristics of a graph that allow a viewer to store the information in a meaningful form for future reference.

The manager as designer

David Tarrant, vice president of Graphic Communications, agrees that “the average person is not trained in the graphic arts. If you pick up a blank piece of paper and ask them to create something themselves—forgetting about their drawing skills—they will do a terrible job. They will lay things out badly, the proportions will be bad, they’ll select colors that are just outrageous.” However, he points out that Graphwriter, produced by Graphic Communications, has several features designed to overcome the lack of graphics training of its users and thus help them turn out effective graphs. These features include a chapter in the user manual giving general examples of how to plan a presentation and select the proper format and style of chart, an illustrated format selection guide

booklet, which Tarrant describes as an “idea generator that someone preparing a presentation might flip through to decide what kind of graph to use with that kind of message,” and guidelines for the use of each type of chart. In addition, Graphwriter’s chart composition process places headings, legends, and chart elements on the page dynamically, relative to the other elements, instead of forcing the user to fix the position of each element as he composes the chart.


Peter Stein, market communications manager for Business & Professional Graphics of Cambridge, Mass., manufacturers of BPS Business Graphics for the IBM Personal Computer and authors of the Apple Business Graphics program, sees the same problems confronting users without graphic design experience. He says that with BPS Business Graphics, “We started out at a very basic level—in the documentation—to help the user select the proper format graph. About a third of our user manual is dedicated to basically a cookbook of sample graphs. It’s a tutorial manual which shows you about 70 varieties of graphs, what you use them for, and how to execute them with the software. It includes some fairly general observations as to, for instance, what a pie chart really does, what are the best things you can do with trend analyses, or why you should look for a smooth moving average if you want to look at your stocks chart.” Business and Professional Graphics also has a toll-free technical support hotline for its customers.

The problem with approaching user education through the documentation is that, as Ken Phillips notes, nobody reads user manuals.

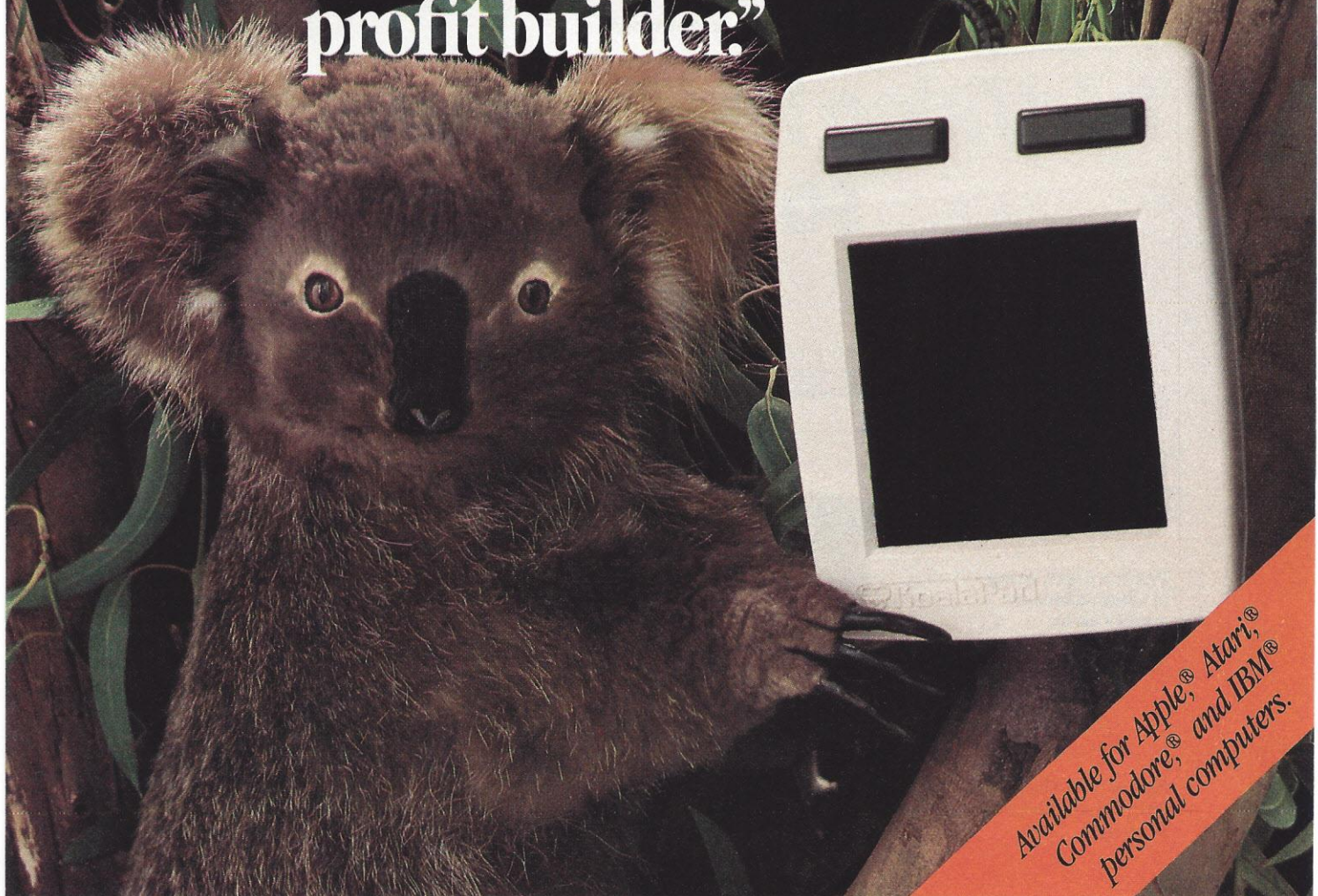
For that reason, there’s strong sentiment in the industry that “smarter” software is necessary. David Tarrant envisions future software that will incorporate in its logic “the decision rules that a graphic designer would

use. You might even have software that will say to the user ‘Okay, what point do you want to make?’ and would then come back and make some suggestions as to how to best make that point, help him select an appropriate chart form, and maybe call out the fact that the chart he’s done isn’t as well designed as it might be.”

Interestingly, most users don’t see any difficulty with the “intelligence” of the current graphics software. Peter Crowell, who previously had used graphics produced by a mainframe computer, said about Graphwriter, “The fact that it’s so easy to learn to use it is its number one feature.” Ken Phillips, who regularly had charts prepared by the Citicorp graphics department before obtaining the Apple Business Graphics System, stated flatly, “I think quite frankly that’s asking too much. To know the most effective way to present statistical data, you’ve got to know something about statistics. In presenting sophisticated statistical information, it’s unrealistic to expect the software to become a decision model in selecting the proper presentation format.”

For now, perhaps the best feature of the current presentation graphics software for helping you learn how to use graphs effectively lies not in the documentation, but in the speed with which you can create, view, and edit your output. Almost every user we talked to emphasized that, while their first efforts were not necessarily of professional quality, the speed and ease-of-use of these packages encourages one to experiment with different formats, and consequently, fosters a rapid learning curve. Your first effort might not be perfect, but when the software makes it so easy to practice, it probably won’t be long before you have your graphics package working the way it was meant to and the way you want it to—that is, producing the charts and graphs you need to communicate your message effectively. 

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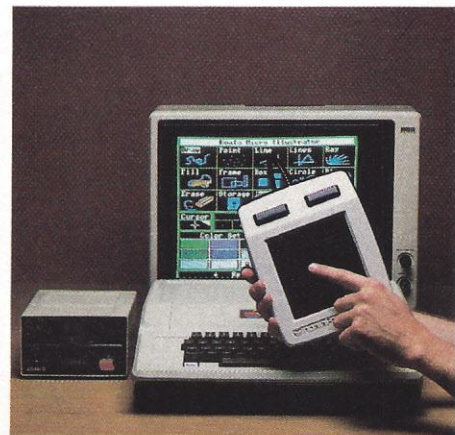
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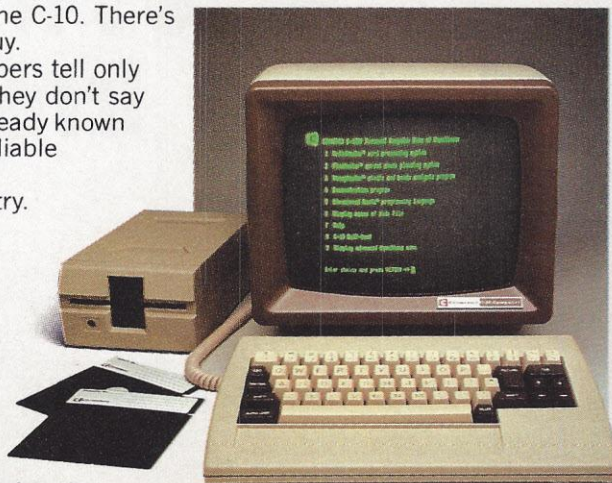
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CIRCLE 109



Portable Computers Make Traveling Easier

Each month Personal Computing scans the hardware market to keep you up to date on everything that's new. Those products we consider to be most useful and exciting in this month's crop are described in this section and commended for your closer examination. Others are listed in Showcase of Products, our special subscriber section.

PORTABLE POWER FOR THE TRAVELING EXECUTIVE

One of the most elegant portable computers scheduled for a September debut fits into a briefcase and offers the services of an accountant, secretary, and personal valet combined.

It's the Gavilan personal computer, an MS-DOS-based, nine-pound, 16-bit computer with expandable memory (80k internal with up to 128k of additional memory via plug-in capsules), a solid-state mouse, zoom and file features, and a powerful array of data-structuring software allowing storage of up to 40 pages of documents.

The computer is the premier product of Gavilan Corp., a Campbell, Calif.-based firm formed in February 1982 from a corps of top ex-Zilog Inc. managers. Their express purpose was to develop a portable computer for the traveling executive—any of 16 to 21 million Americans who require multiple “desks” and powerful computing tools that can be toted around easily and hooked into other data bases via standard telephone lines.

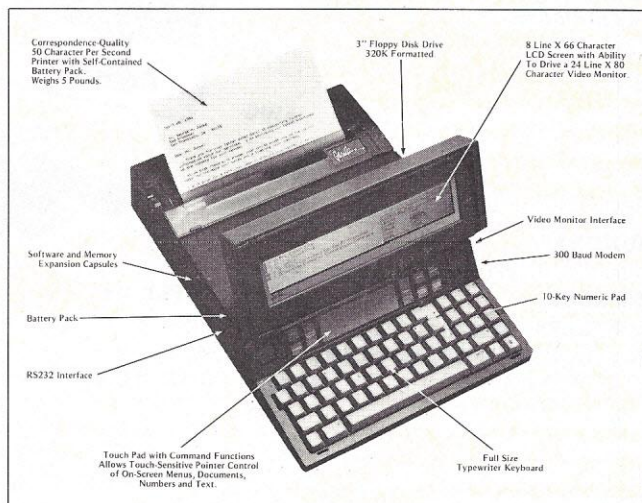
Up to now this market has been largely unpenetrated, according to Gavilan's vice president for marketing, John Duffy Jr. Duffy says that little more than one percent of the traveling executives are using computers and that they are “somewhat naive” about them, and unwilling to spend precious time attending computer schools.

For them, the Gavilan seems a real solution. Priced at \$3995, it offers the speed, efficiency, and ease of use that any executive might demand. And the machine itself is an excellent helper: It can be learned in 15 minutes, boots automatically as you open it, and is menu-driven with the simplest possible English language prompts. (The system, we might add, will be marketed in five languages.)

Personal Computing was at the Comdex convention in Atlanta, Ga. (April 26-29) when Gavilan's president, Manny A. Fernandez, announced and demonstrated this computer for the press. The Gavilan's compactness and precision graphics were immediate attractions, as was the “look” of the keyboard. The system included a wide-screen 8 by 66 character LCD display as well as full-size typewriter layout and 10-key pad, and was plugged into a

standard monitor with ease. The system, we learned, runs for eight hours on rechargeable batteries, features MBASIC and Pascal, 3-inch microfloppies (up to two disk drives are available; each disk is 320k formatted), an RS-232 interface for connections over the phone, and plug-in memory expansion capsules that can add 32k, 32k ROM, 32k PROM, and 32k EPROM. In all, it's a sleek, powerful system capable of taking on desktop counterparts, and surprisingly versatile because of Gavilan's proprietary software (called CapsuleWare).

Executives can use the system for their spreadsheeting, calculations, word processing, time keeping, electronic mailing, and form processing, all of which can be printed



Gavilan's compact design includes all the features and equipment needed for many computing tasks.

out conveniently, and in near letter-quality, on the optional five-pound portable printer (\$985) Gavilan has also developed.

Of its many features, though, this premier Gavilan's most intriguing was its simplified human interface—the “mouse,” in computerese. This pointer device allows the user to forego difficult and time consuming cursor moves in the keyboard for a direct electronic “finger-painting” action with the hand. In other words, you use your finger to move the cursor wherever you want it to be on the screen. Simple command menus can be accessed—the user can open files, delete, copy, undo, and move items, etc., all by tapping the mouse lightly to make an entry. Two taps, for example, gives you a letter; three, a word;

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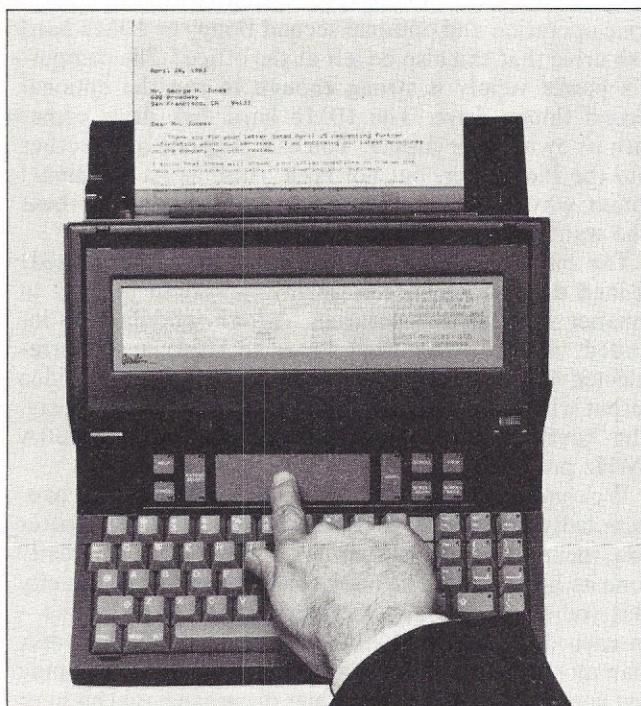
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HARDWARE OF THE MONTH

one more, a sentence; and still another, a paragraph. What's more, the Gavilan can actually zoom in on different parts of the document: Press "zoom," and a reduced picture of the entire document appears in a small window on the screen. The cursor then disappears, and the user can manipulate an electronic window to the desired section of the document, which then appears in full size so the user can write, edit, and delete, etc. This curtails the



Gavilan's touch panel lets a user move a pointer on the screen to the specific file or item desired.

need for extensive backward and forward scrolling of long documents. The zoom feature, incidentally, is being patented.

This summer Gavilan is testing its product on several companies with large staffs of traveling professionals. Their plan at present is to market the product through large, self-sufficient end-users, software houses wanting to write integrated software packages for various professions, and finally, large computer companies who want to add Gavilan to their own existing lines under their own label. *Personal Computing* is a bit disappointed. What about individuals who want to buy the Gavilan for themselves? Gavilan officials say they are currently working on the problem.

FOR MORE INFORMATION: GAVILAN COMPUTER CORP., 240 Hacienda Ave., Campbell, CA 95008; (408) 379-8000.

CIRCLE 490

—Arielle Emmett, Associate Editor

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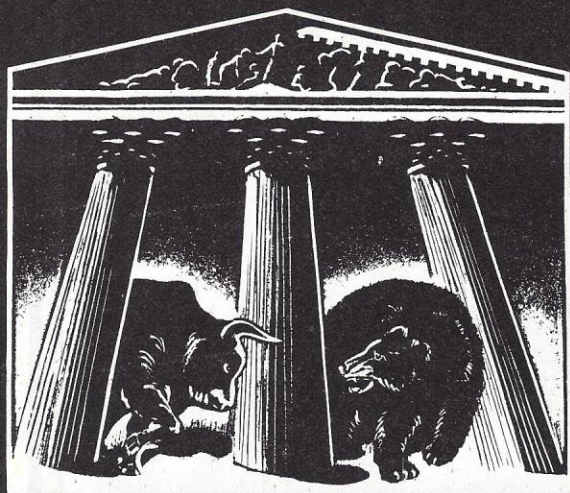
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CIRCLE 84



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CIRCLE 95

HARDWARE OF THE MONTH

LOW COST PROFESSIONAL PORTABLE

STM's Pied Piper offers professionals a low cost, portable CP/M-based hardware/software computing system for their commuting and travel needs.

Many computing systems trundle between work and home. Since that's the case, STM reasons, why not leave the large, heavy monitor in the office, and take the core system home and use it with the TV or a second monitor? Furthermore, why not have a system with single disk drive operation and optional second floppy or 10Mb hard disk drive that can also be left at the office? The computer's power supply is strong enough to run the optional second floppy drive. The 10Mb hard disk drive comes with its own power supply. You can plug one or the other into the Pied Piper, but not both. And, as an additional option, why not have a lightweight LCD display for those who want to work away from TVs and monitors?

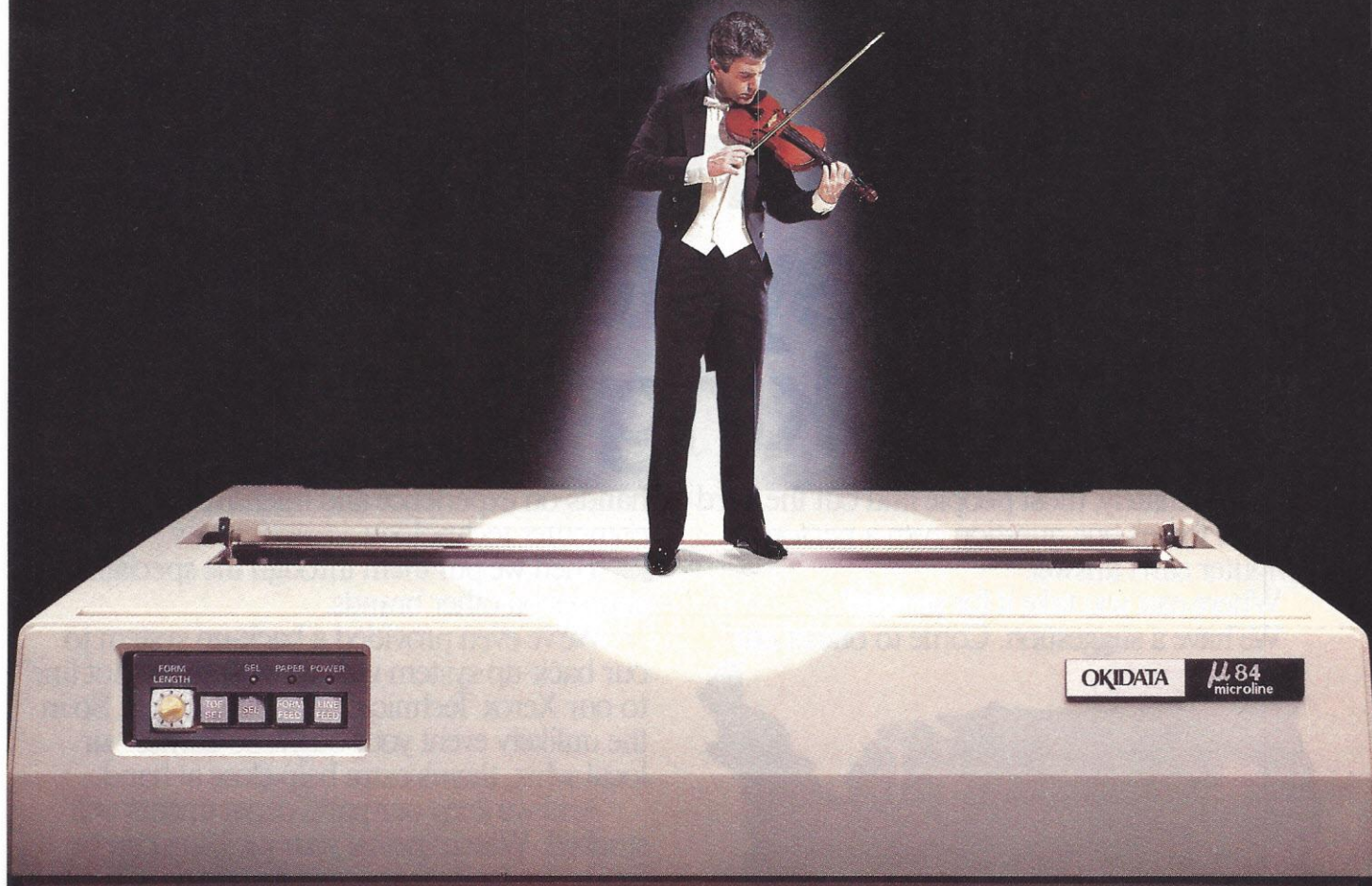
The basic Pied Piper includes one 800k (formatted) 5¼-inch drive, with special operating system utilities to enhance single-drive operation. An RF modulator is included, allowing the Pied Piper to drive a software-selected 40-column TV display. It also has a second video output which drives a normal 80-column monitor display. The keyboard/disk drive/CPU module contains a Z80A 4MHz processor and 64k RAM.

We had reservations about the utility of a professionally-oriented system with only one drive, no matter how inexpensive the system was. But STM has really done its homework. The 800k drive has so much capacity that you can install any given program—or programs—on each data disk, and still have more storage per disk than most other systems. Do a little comparison shopping and you'll see that one Pied Piper drive can equal eight or more drives on competing machines. The Pied Piper's single-drive utility software includes single-drive disk formatting, file transfer, and disk backup programs. They're all designed to minimize floppy swapping.

Taking off the dustcover took some finesse at first—the clips holding it on in back may break if the lid is forced. It's the sort of thing you get used to quickly, but new users should be warned about it. The dustcover stayed put when snapped in place, however, and that's a lid's most critical feature.

With the dustcover closed over the keyboard and the spring-loaded carrying handle pulled out, the Pied Piper looks like a small two-tone briefcase. Weighing less than 13 pounds, the computer is half the weight of many other portables. It measures 4 x 20 x 11 inches, with or without the optional LCD display. The display module flips up for easy viewing, and down for travel. This option wasn't ready in time for our demonstration, but should be ready sometime in July—along with the second-drive options, which fit on top of the built-in drive.

(continued on page 187)



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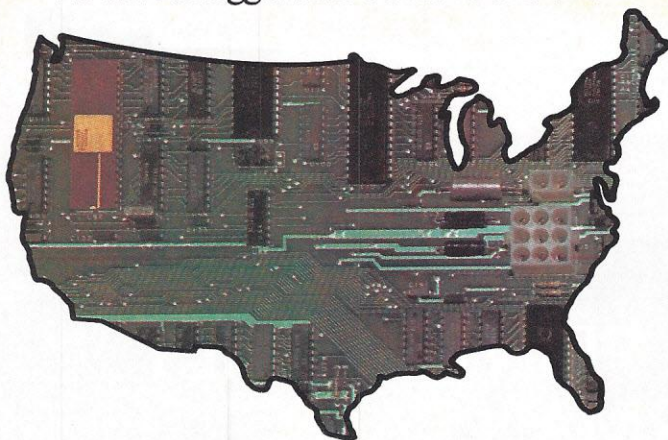
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Unfortunately, most people find out the hard way that there's one question even a personal computer can't answer.

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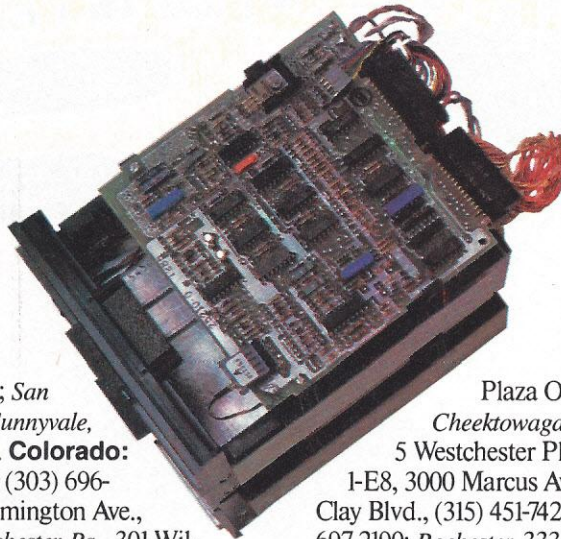
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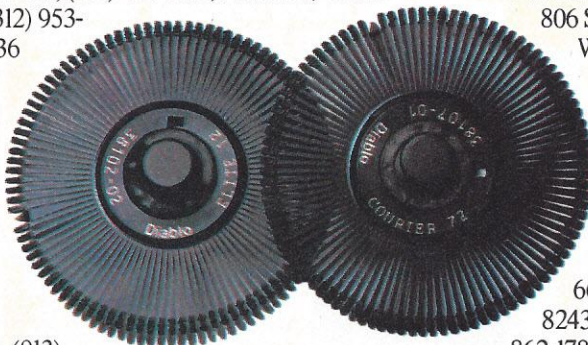
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Our expertise in both hardware and software has gone into the development of the Microsoft Mouse. Now you can plug in the most exciting computer product of the year and put it to work.

The Mouse lets you move the cursor freely and naturally, then execute commands at the push of a button.

The Microsoft Mouse is a complete system. It comes with an on-screen tutorial, a practice application, and the Multi-Tool™ Notepad, a mouse-based text editor, so you can begin using the Mouse right away. And for application developers, the Mouse includes a programmable

interface driver to give your application program complete control over the Mouse's operation.

That's the kind of support you'd expect from Microsoft. After all, we were the world's first microcomputer software company. Today, more than a million microcomputers are running Microsoft languages, operating systems, application programs, and hardware-software combinations.

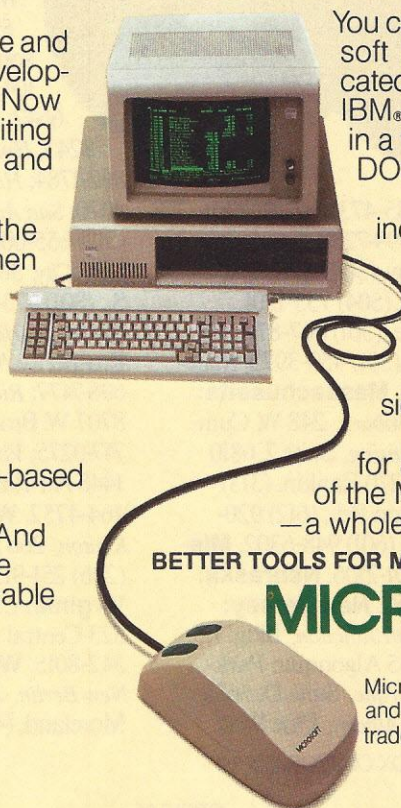
You can get the Microsoft Mouse in dedicated versions for the IBM®-PC, PC XT, and in a version for MS™-DOS machines with serial interfaces, including the IBM-PC. The Mouse supports all versions of MS-DOS, including version 2.0. Ask your Microsoft dealer for a demonstration of the Microsoft Mouse—a whole new standard.

BETTER TOOLS FOR MICROCOMPUTERS

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CIRCLE 86



(continued from page 182)

The Pied Piper's software makes it a true system—not just another pretty hardware “face” in search of a program. The package includes the CP/M 2.2 operating system, and a broad line of Perfect Software products: Perfect Writer, Perfect Speller, Perfect Calc and Perfect Filer. STM has certified many other CP/M-based programs as compatible with the Pied Piper, including SuperCalc, MBASIC, dBASE II, WordStar, Multiplan, CP+ (an English-language “shell” for CP/M), FPL (Financial Planning Language), BLS (Bottom Line Strategy), TMaker III, Condor Database, Money Maestro, and the Rocky Mountain Software accounting package. CP/M 3.0 is not available because of the additional RAM requirements. (The Pied Piper has no provision for memory expansion.)

Loading a diskette into the drive, we observed that the drive latch is recessed inside the drive housing to prevent damage while on the road. The high-capacity drive mandates careful handling of diskettes; the densely packed

disks are more vulnerable to fingerprints, cigarette smoke, and physical handling than those used with lower-capacity drives found on most other computers. You don't have to be a fanatic—just be reasonably careful.

STM uses standard CP/M, except for the single-drive convenience utilities, so that the user, who may be familiar with CP/M-based software, won't have any problems using the software provided.

A 78-page owner's manual introduces the owner to both the hardware and the operating system—enough for anyone who just wants to run the applications software that comes with the computer.

Sitting down at the keyboard, you notice some nice attentions to ergonomics, such as large “command” keys (SHIFT, RETURN, TAB), placed in the conventional IBM Selectric typewriter positions so many new computers flout. A large complement of computer-specific keys gives the machine added versatility (ESC, CTRL, FUNCT, LINE FEED, BREAK, cursor control). There are only two cursor control keys; you hit another key first

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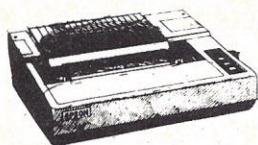
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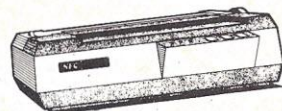
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NEC 8023

Dot Matrix
Printer

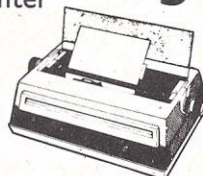
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SMITH-CORONA TP-1

Letter Quality
Printer

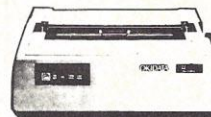
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"When we purchased a computer system for our CPA firm, we were promised a software package would be developed specifically for CPA's. But after a year, the software package never materialized. We had to take the system back and find another computer system that would meet our needs."

SOLUTION:

"We looked around and talked to several computer dealers, but MicroAge was the only dealer in our area that offered to solve our firm's problems, not just sell us another computer. MicroAge evaluated our firm's needs for a computer and recommended a three user Altos computer system with client write-up software. MicroAge delivered and installed the complete package in our office and worked with us to get our system operating the way we wanted. Plus, MicroAge stayed within our budget."

"Our projected savings in just time alone are \$30,000 within the next three years. Today we can handle as much as a 40% increase in clients with no increase in personnel."

"Would I purchase again from MicroAge? Absolutely!"

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COMPUTER STORE
"The Solution Store"™

HARDWARE OF THE MONTH

to toggle a change, telling the cursor to move right and left or up and down.

Overall, the Pied Piper's price may help the continuing trend among manufacturers to provide complete hardware/software systems at reasonable cost. STM, located in Menlo Park, Calif., has a design philosophy which leans toward simplicity and high quality, rather than complexity or quality compromises to meet price goals.

STM offers the Pied Piper in a \$2000 package with 80-column monitor, and either letter-quality or dot-matrix printer. The computer sells for \$1299—including the software, keyboard, CPU, and one disk drive. The LCD display runs under \$500, the second floppy drive under \$600, the 10Mb hard disk (probably Seagate) under \$2500, the RS-232C serial port under \$200, and under \$300 with a 103J-compatible 300-baud modem. STM has signed an agreement with Xerox to service the computer. If you have an STM Pied Piper dealer around you (they're on both coasts and moving inland), and if price is an object, you should see this computer before you decide to buy. You could get the Pied Piper for yourself—and a VIC-20 or comparable system for the kids—and still come out ahead.

FOR MORE INFORMATION: STM ELECTRONICS CORP., 525 Middlefield Rd., Menlo Park, CA 94025; (415) 326-6226.
CIRCLE 494

—Lee Thé, Associate Editor

SSM'S 300/1200 BAUD, 212A-COMPATIBLE MODEM

SSM's new TransModem 1200 will appeal to those who want a full-featured, high-speed modem—that's also easy to master. Some very good high-speed modems are so complex in operation (and documentation) that the average professional might despair of ever getting the hang of it. But as long as your computer has a standard RS-232C serial port, you should be in business. The modem can be directly addressed from within many telecomputing software packages, making it less demanding of software as well. And the 26-page manual testifies to the TransModem 1200's simplicity of operation.

For Apple IIe and II Plus owners it's even simpler: they can buy the TransModem 1200 in SSM's Transpak 2+ package. The package contains everything required to use an Apple for telecomputing: the modem, a serial interface card that plugs right into an expansion slot, connecting cables, and a copy of TRANSEND 2. TRANSEND 2 is a sophisticated telecomputing program we've used a lot at *Personal Computing*. Those who need electronic mail can get the same setup with TRANSEND 3, which adds electronic mail capability to your system (especially if you also get a clock card). The system containing the electronic mail package is called Transpak 3+.

The TransModem 1200 certainly has the features

Introducing The Shrewd Modem



**automatic dialing,
300/1200 baud for \$599***

**Bell 103/113/212A compatible
Full or half duplex (local echo)
Phone line audio monitor
Complete self-test system
Two-year warranty**

Our newest modem is based on just three USR-designed microprocessors—by far the lowest parts count of any 212A modem available. Its resulting simplicity promises two major benefits. The first is outstanding reliability—that not only stands to reason, it's backed by a two-year warranty. The second is a cost low enough to inspire skepticism. Be skeptical; shrewd comparisons may save you as much as \$100. The shrewd modem. If it's not at your dealer's yet, write or call for complete specifications.

¹⁰⁷³
*Suggested list for model 212A Auto Dial, quantity one.

**I would like additional information
on USR modems by ☐ mail ☐ phone.**

Name _____

Company Name _____

Street _____ Phone _____

City _____ State _____ Zip _____



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CIRCLE 83

July 1983 PERSONAL COMPUTING 189

appropriate to a high-performance modem: Bell 212A compatibility, low signal detect threshold, half- and full-duplex operation, auto-dial/auto-answer, handset connection, automatic switching between touch-tone and pulse dialing, auto detection of pulse or tone line, auto baud rate detection/setting, auto parity detection, ability to remember a number for auto-repeat dialing, call progress reporting through status lights and computer feedback, software compatibility, low heat buildup, and user support. That's an extensive list, but the TransModem has it all.

Almost all high-speed modem users need Bell 212A compatibility. Some relatively inexpensive 1200 baud modems use 202 Bell protocol; but that is of marginal utility for most people. And even modems advertised as 212A-compatible may lack 300 baud capability. But the TransModem runs at both high and low speeds, as the 212A protocol specifies. It also runs at half and full duplex. The latter enables you to see what actually reached the other end on your own screen, as well as providing for

sophisticated error-checking techniques because of the higher degree of feedback.

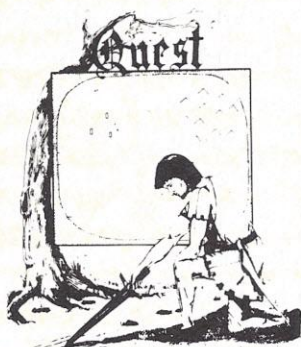
A critical feature for long-distance modem operation is a low carrier-detect threshold. SSM claims a -43 decibel threshold for the TransModem—a superior level of sensitivity, especially when you consider the fact that the decibel scale is non-linear; so -43 decibels differs greatly from -40 decibels, for example. Our demonstration unit grabbed and held onto distant connections with great success. Many a lesser modem has fallen down in this regard.

The TransModem abounds in automatic features, of which the foremost is auto-dial/auto-answer capability. You need auto-dial so you can set up an automated call directory of most-used numbers in your software. That may sound like a luxury—until you start regularly using the several dozen digit sequences required for Sprint, The Source, and other dial-in utilities. Moreover, the modem has to be able to wait at the appropriate moments in such sequences. With the TransModem, entering "K"s into

(continued on page 195)

AARDVARK

TRS-80 COLOR COMMODORE 64 VIC-20 SINCLAIR/TIMEX TI99



QUEST — A NEW IDEA IN ADVENTURE GAMES! Different from all the others. Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time. 16k TI99, TRS-80 Color, and Sinclair, 13k VIC-20. \$14.95 each. 32K TRS 80 COLOR Version \$24.95.

Adds a second level with dungeons and more Questing.

BASIC THAT ZOOOMMS!!
AT LAST AN AFFORDABLE COMPILER!
The compiler allows you to write your programs in easy BASIC and then automatically generates a machine code equivalent that runs 50 to 150 times faster.

It does have some limitations. It takes at least 8k of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and INTEGER NUMBERS FORM 0-64K.

TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20-page manual and can be modified or augmented by the user. \$24.95 on tape or disk for OSI, TRS-80 Color, VIC 20, or Commodore 64.

SEAWOLFE — ALL MACHINE CODE In this high speed arcade game, you lay out patterns of torpedoes ahead of the attacking PT boats. Requires Joysticks, at least 13k RAM, and fast reflexes. Lots of Color and Sound. A fun game. Tape or Disk for Vic20, Commodore 64, and TRS-80 Color.

\$14.95 Tape - \$19.95 Disk.

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DERELICT by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

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Dealers — We have a line of about 100 original programs for the machines listed here. We have High speed Arcades, Quality Adventures, Word processors and Business Software for Small machines. Better yet, we have excellent Dealer support. Phone for information.

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CIRCLE 71



cousin:

as, for when you read this letter you shall know-
ish the thought-that I have perished! You see, my bar-
ter holds instructions to forward this letter ONLY IN
EVENT OF MY UNFORTUNATE DEMISE!

EVENT OF MY UNFORTUNATE DEMISE

Years ago, during my worldly travels, I chanced upon a treasure map suggesting huge wealth buried on a little-known tropic isle. Naturally, I pursued it, forthwith and unwittingly, fully suspecting certain unspeakable dangers inherent to the task. Unfortunately, they proved to be dangers so vile, so terrible, so incredible, that no human being should ever be forced to face. Yet, I faced this force of evil and, as you may realize upon receipt of these words, have indeed succumbed in the attempt.

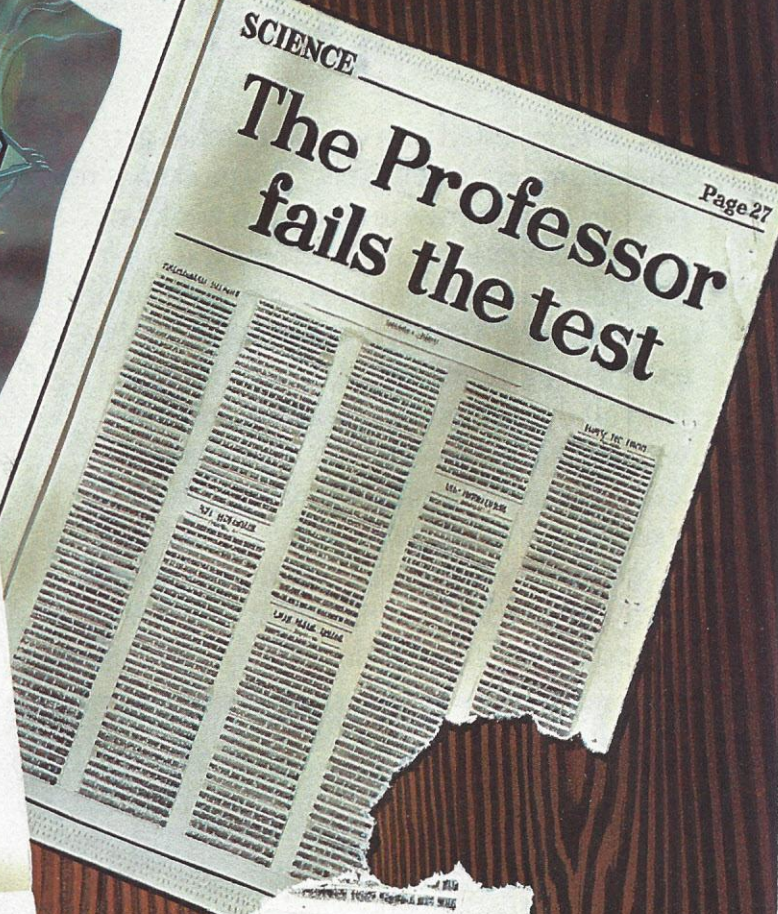
challenge is passed along

Though I may have failed, the challenge is passed along to you! So accept the torch. Go! Seek it out, to wit and forthwith. But hark, I warn you—stay alert, be ever on your guard, and beware for your very life! Because each step of the way you will face DEATH IN THE CARIBBEAN.

Your loving cousin,

Professor Herman C. Hemmerdinger

PROFESSOR HERMAN Q. HEMMERDINGER
BS, BA, MS, PH.D., DINERS CLUB, BLUE CROSS



OBITUARY

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[The following text is heavily obscured by a large circular stamp and is largely illegible.]

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CIRCLE 120

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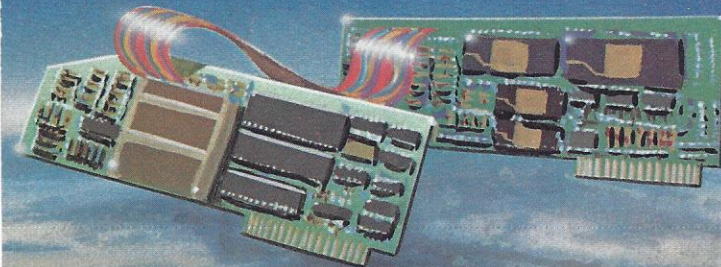
The Cats are at leading computer stores.

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It's smaller. 1/5th the size of an ordinary modem. Easy to stick-on, tuck-in, put anywhere you want. Auto-answer. Also, no fussing to get into the right mode, answer or originate—J-Cat does it automatically. \$149*



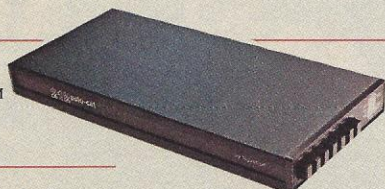
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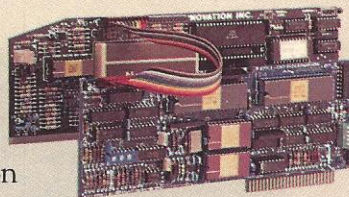
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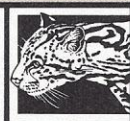
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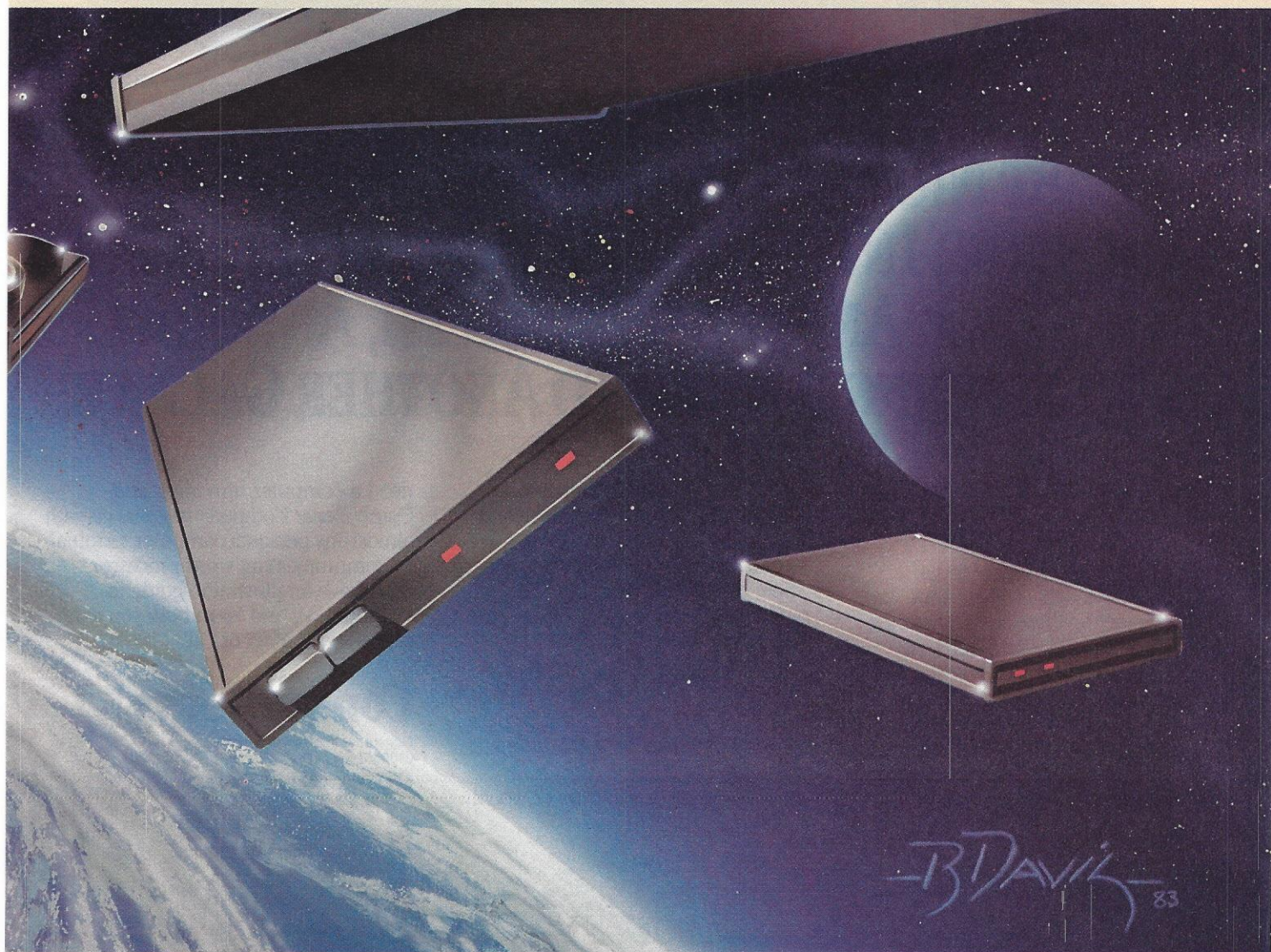


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CIRCLE 63





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CIRCLE 35

HARDWARE OF THE MONTH

(continued from page 190)

your dialing sequence makes the modem wait five seconds for every "K" it encounters in a number. And the modem has a 32-character dial capability, so it can handle the longest sequences.

Without auto-dial, you need to have a telephone on the same line as the modem. TransModem has a telephone connection outlet for your convenience, but it isn't required. One nice touch: You can connect the wall outlet line and the handset line into either of the two modular plug ports. The TransModem automatically senses which is which.

To engage the modem in direct mode, we'd just type CONTROL E while in the software's terminal window, and the modem would answer (on-screen): "HELLO, I'M READY." Then to dial, we'd type D and the number. The modem then rewrites the number on-screen so you can double-check. Hit a carriage return and it actually dials the number. It tells you when it's "DIALING... RINGING..." and then tells you what happened. Unlike some modems that make you wait and wait and still don't tell why a call fails, the TransModem can tell you: "BUSY," "ONLINE," "VOICE!" (a person rather than a computer picked up the line at the other end), or "FAILED CALL" (the call didn't go through). This is one of the SSM product's nicest features. One command our modem lacked was a means of hanging up. We had to unplug it if we couldn't get the party on the other end of the line to disconnect. However, by the time you read this, the modem will be supplied with a ROM chip that provides this rather useful ability.

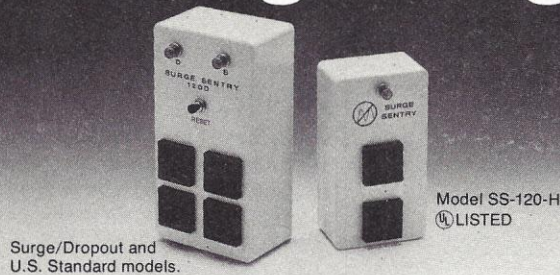
While dealing directly with the modem, you can also change 22 operating parameters by commanding O when the modem says it's ready for commands. Then you give the modem the number of the parameter and the setting you want. These include things like synchronous/asynchronous setting, Bell 103/212 or 212 only while operating in answer mode, data character length, originate or answer mode only (for use with leased lines), various disconnect protocols, respond to remote diagnostic test, automatic answer, automatic redial, etc. So while the modem works largely automatically, users with specific needs can reconfigure the modem as needed.

SSM sells the TransModem 1200 for \$695, complete with 6-inch RJ11 telephone cable and AC power plug/cable. It will work on any computer with an RS-232 interface. The Transpak 2+ sells for \$999, and the 3+ for \$1100; either of these add complete preconfigured telecomputing software/hardware capabilities to an Apple IIe or II Plus.

FOR MORE INFORMATION: SSM MICROCOMPUTER PRODUCTS INC., 2190 Paragon Dr., San Jose, CA 95131; (408) 946-7400. CIRCLE 495

—Lee Thé, Associate Editor

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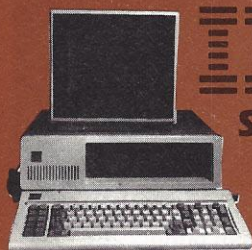
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CIRCLE 92

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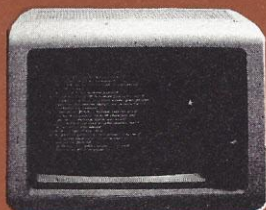
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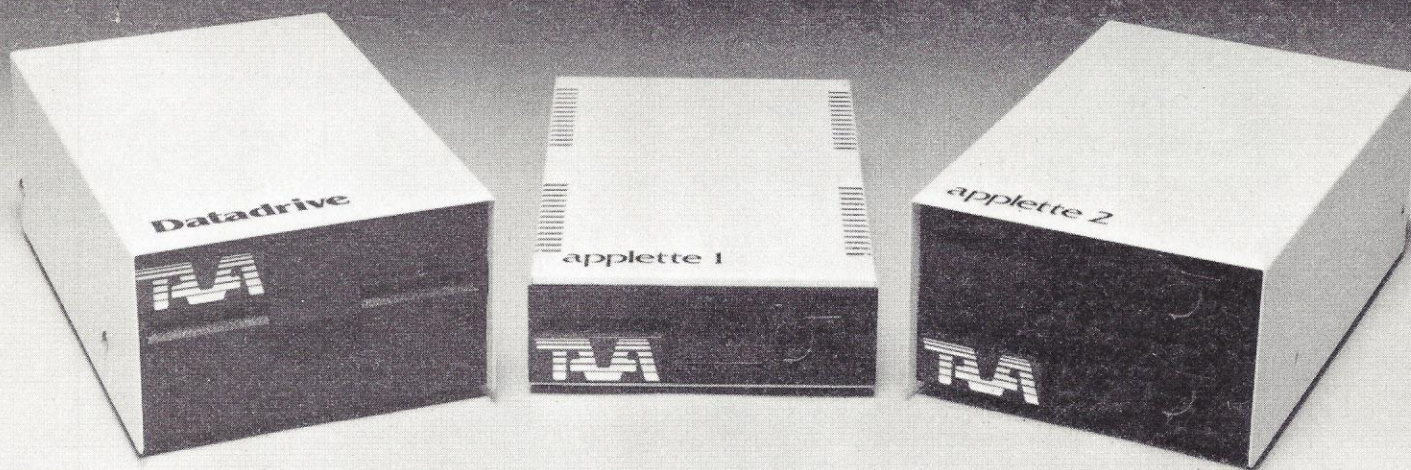
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Word-Processing Packages Offer Advanced Capabilities

Each month Personal Computing scans the software market to keep you up to date on everything that's new. Those products we consider to be most useful and exciting in this month's crop are described in this section and commended for your closer examination. Others are listed in Showcase of Products, our special subscriber section.

WORD-PROCESSING PACKAGE ALLOWS USE OF A MOUSE

Microsoft's latest addition to the Multi-Tool line of productivity software is Multi-Tool Word, a word processor the company bills as powerful and easy to use.

Multi-Tool Word gives you the power of multiple windows, a set of preformatted options called style sheets, footnoting, sub- and superscripting, glossary buffers,

With its word-wrap capability, Word instantly re-formats as text changes are being made, without the need for any special reformatting key. Users can also format text directly. By pressing two designated keys, a user can choose boldface, italics, underlining, or other options for characters, words, paragraphs, or blocks of text.

Multi-Tool Word has a ruler, which, when called, appears at the top of the screen and gives users immediate access to margins and tabs. Tabs can be aligned left or right or centered. Users can choose dashes or dots to function as leaders in tables of contents, columns, or other tabular data.

Multiple windows give the experienced user more power by allowing him to see different portions of the same file or a number of different files to compare text or assemble a document. Users can transfer text from one window to another—a search command finds the exact section to be moved and eases its transfer.

The style-sheet capability promotes consistency of format for all types of documents. A user can choose a format from available style sheets or he can formulate his own, and store it for further use. This way, a business can establish a format standard for all of its documents.

Multi-Tool Word lets users abbreviate or predefine phrases to be stored in the glossary buffers. This speeds text entry and editing, and is especially useful for legal applications. A phrase such as P1 could stand for "party of the first part." The user can enter the abbreviation, hit the EXPAND key and see the full phrase appear on screen.

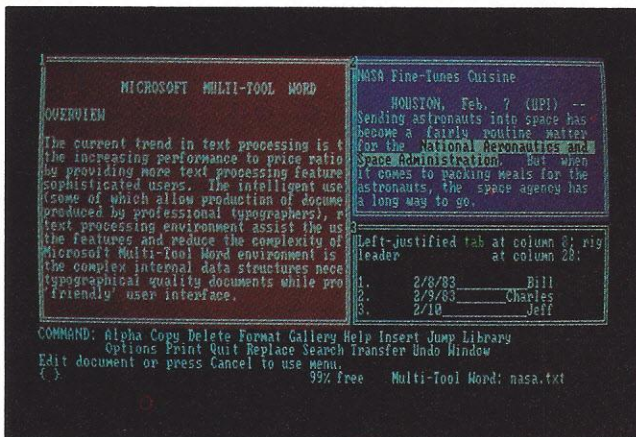
Designed for easy adaptation to future hardware requirements, follow-up versions to this product will include hyphenation, spelling checkers, and other dictionary-based applications. Multi-Tool Word runs on MS-DOS-based systems and retails for \$375.

FOR MORE INFORMATION: MICROSOFT CORPORATION, 10700 Northrup Way, Bellevue, WA 98004; (206) 828-8080.
CIRCLE 484

NEW EDUCATIONAL GAMES FROM SIERRA ON-LINE

Kids should enjoy Sierra On-Line's Learning With Leeper and Troll's Tale. And these games teach children useful skills, too. Learning With Leeper was designed for preschoolers, while Troll's Tale is a gentle adventure-type game for readers at the third-grade level and above. But parents can help extend the usefulness of both games to kids older and younger.

Learning With Leeper contains four games, linked by



Word's multiple windows give you access to portions of one or more files to compare text and assemble documents.

multiple fonts and formats, and a horizontal scroll for text which is wider than the screen.

Ease of use stems from a "see what you get" approach—users can see text as it will be printed at any time during the writing process. Other user-friendly features are an "undo" command, word wrap, direct formatting, and a context-sensitive Help system.

A key to ease of use for Multi-Tool Word is its provision for an electronic mouse that can point to and execute commands. The Microsoft Mouse is specially designed for text writing and editing. It lets users underline, delete, scroll, select and execute commands. The mouse is designed to make cursor movement simpler.

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If you're about to buy a personal computer, you need to consider two basic

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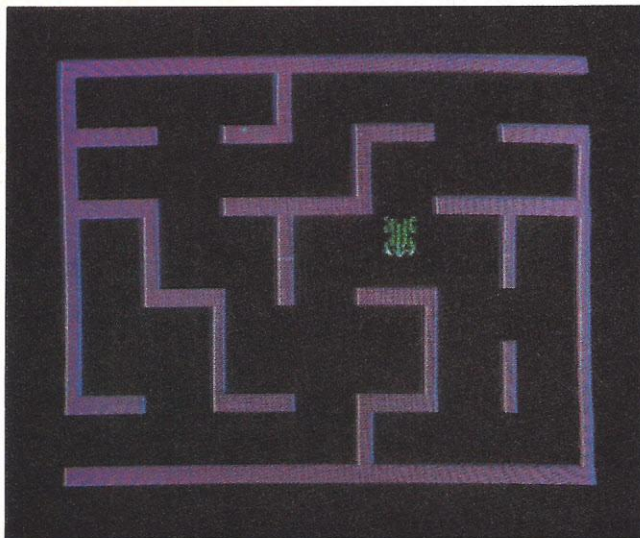
 **HEWLETT
PACKARD**

a main menu. Dog Count helps children develop counting skills, Balloon Pop teaches shape matching, Leap Frog concentrates on hand-eye coordination, and Screen Painting stimulates creativity. Learning With Leeper uses no words. Leeper sits in the middle of the main menu display, with arrow-like lines pointing to the corners, where four choices are symbolized by a dog, balloon, frog, and overturned paint can. When the child pulls on the joystick the Leeper moves. Whichever figure the Leeper reaches for gets selected.

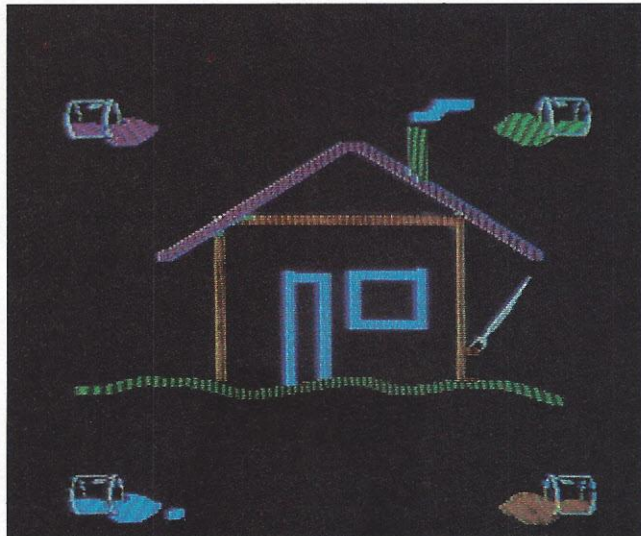
In Dog Count, the child moves the Leeper with the joystick to pick one of five rows of different numbers of bones. If the number of bones picked matches the number of dogs, the child gets to watch the dogs walk over and get the bones. Then the screen explodes in congratulatory graphics and a smiling face indicates the child has scored. If the child doesn't pick enough bones, the leftover dog looks disconsolate and the child doesn't score, nor does he score if there are bones left over. But that's all—the game doesn't scold him. Kids laugh with delight when they see how the dogs are animated.

Balloon Pop displays a row of big letters across the bottom of the screen, and another letter (which matches one of the ones below) above them. The object is to pick up the matching letter from the row and bring it to its match above, using a balloon with a hook. After a few successes, the child gets to pop balloons floating by in a kid's version of an arcade game.

In Leap Frog, the child steers a frog through a series of mazes whose difficulty is determined by the computer's assessment of how well the child negotiates the simpler ones. In the faster mazes the frog is chased by a large



In Leap Frog, the child guides a frog through a series of progressively difficult mazes.



Four colors of paint in the screen's corners and a paint brush await a child's artistry in Screen Painting.

centipede-like figure, but when it catches up with the frog it just bumps against it, slowing it down. The centipede is displayed as a string of connected balls that climbs over itself when reversing direction—amusing to watch.

Screen Painting gives the child a paint brush and four cans of different colors in the screen's corners. Colors are chosen by moving the brush to the correct can and picking up that color. Pushing one game-control button keeps the brush from painting if the child just wants to move the brush somewhere. Pushing the other game-control button clears the screen for a new drawing.

Older kids will find Troll's Tale of more lasting interest than Learning With Leeper. Kids as young as five or six can play the game with active adult help, and junior high-schoolers—even senior high-schoolers new to computers—can enjoy this game with a little handicapping. This is basically a classic text plus graphics adventure game. The child searches through a cave/landscape maze with both conventional and magical connections between rooms and points, looking for the treasure hidden there by a wicked troll. But a streak of morality has been worked in. The child is looking for the treasure in order to return it to its rightful owner, not to keep it for himself. In one place, the child finds three candy pops. He takes one that belongs to the rightful owner, and has the option of taking another. But the game won't let him take two, warning that immoderate candy consumption leads to the dentist drill.

For younger kids an outline map is provided, along with a compass decal they can stick to a corner of the monitor. A child can fill in the map with details as he explores the troll's world. An older child will enjoy making his own

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map (and an intricate one it is, with dozens of interwoven paths and sites). A number of features keep the game from becoming dull. Some treasure is illusory or impossible to take, and when the troll shows on-screen, the child can't take any treasure that may be present. The troll appears more frequently as the game progresses. It's interesting to see how thoroughly grammar-school kids can suspend their disbelief and enter into the spirit of Troll's Tale. Sierra On-Line is justified in calling Troll's Tale a learning game. It helps kids develop the ability to identify details, make inferences, predict outcomes, draw conclusions, and make maps.

Both games run on Apple IIe and II Plus personal computers with either monochrome or color displays. Game paddles can be substituted for a joystick on Learning With Leeper. Learning With Leeper costs \$25.95; Troll's Tale is \$27.95.

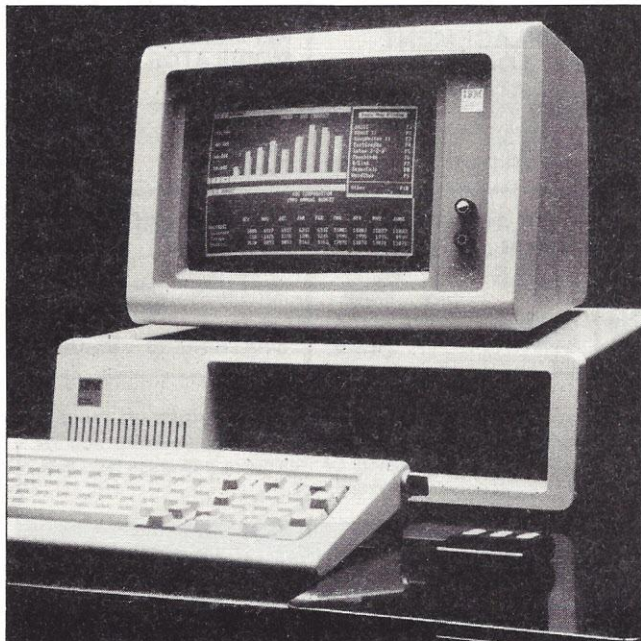
FOR MORE INFORMATION: SIERRA ON-LINE INC., Sierra On-Line Building, Coarsegold, CA 93614; (209) 683-6858.

CIRCLE 492

—Lee Thé, Associate Editor

MULTI-WINDOW OPERATING ENVIRONMENT INTEGRATES APPLICATIONS

Quarterdeck DesQ from Quarterdeck Software allows users to run and integrate several applications packages from different publishers simultaneously. This package is designed for users, software developers, and systems integrators who want to create integrated, multi-



Quarterdeck DesQ lets users integrate and run applications software from several different publishers at once.

window, user-customized office systems using personal computers.

Using Quarterdeck DesQ, a user can load packages such as WordStar, dBASE II, and Peachtree Accounting into the system and run them simultaneously. Each package gets its own window on the display. The user can mark information in one window and transfer that data into another window. Thus a column of numbers from MultiPlan, SuperCalc, or Lotus 1-2-3 can be transferred to a WordStar monthly report. Transfer of data requires no modification to the applications software being used.

Windows can be full screen, half screen, or smaller. They can be placed in any location and moved around as needed. Windows can overlay other windows, or be hidden until needed.

Users can teach the system to do a routine office task which later can be performed automatically by the system. For example, with Quarterdeck, the user can teach the system by performing each step in turn from logging on, through transfer of data, through copying numbers into a WordStar report. The system will perform the task on its own the next time.

The Quarterdeck DesQ command structure is designed to operate from the keypad, but it will also take full advantage of a mouse which can be added at any time.

Quarterdeck DesQ requires 256k of memory, a disk drive, a 5Mbyte Winchester drive, and a color or monochrome display. It will be available in autumn 1983 and will retail for \$395.

FOR MORE INFORMATION: QUARTERDECK SOFTWARE, 1918 Main St., Suite 240, Santa Monica, CA 90405; (213) 392-9851. CIRCLE 482

WORD PROCESSING PACKAGE WORKS WITH OTHER PROGRAMS

PFS:Write from Software Publishing Corporation is a word processor which can be integrated with all other PFS programs. Data can be shared between the programs. PFS:Write can also read text-file output from most other software.

Documents appear on-screen as they will look when printed. The screen defines a page, and a ruler at the bottom of the screen shows what column the cursor is in and where the tab and margin settings are located. A status line below the ruler gives the name of the document being edited, what document line the cursor is on, how full the document is, and what function is in progress. Help screens are available with a keystroke.

To create personalized form letters, you can insert information from PFS:File data files into PFS:Write. Data tables from PFS:Report can be incorporated into PFS:Write documents. Bar, line, and pie charts from PFS:Graph can be included. Other makes of software can also be used with PFS:Write. Spreadsheets from VisiCalc

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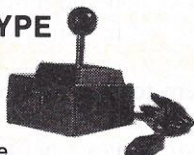
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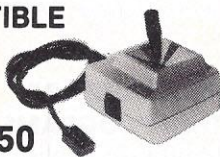
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as well as text from other programs can be inserted.

The IBM Personal Computer version of PFS:Write sells for \$140; the Apple IIe version is \$125. The Apple IIe version will be available in late summer. Each program comes with a manual which has an illustrated tutorial, a reference guide, and a function key template.

FOR MORE INFORMATION: SOFTWARE PUBLISHING CORPORATION, 1901 Landings Dr., Mountain View, CA 94043; (415) 962-8910.
CIRCLE 481

ADVANCED SPREADSHEETS INTRODUCED FOR VIC-20, COMMODORE 64

Three new spreadsheets for the Commodore 64 and the VIC-20—PractiCalc, PractiCalc Plus, and PractiCalc 64—have been introduced by Micro Software International. Each of the new programs (ranging in price from \$39.95 to \$54.95) performs every standard spreadsheet function except windowing. According to Robert Shapiro, executive vice president of marketing for Micro Software International, the intent of these programs is to “offer owners of the VIC-20 and Commodore 64 a serious-minded program that can enhance their computers’ use, both for business and educational applications. Also, these programs should vastly broaden the appeal of the popularly priced computer because they are versatile as well as affordable.” The company anticipates that these programs will encourage the use of Commodore computers to do bookkeeping, future projections, and financial analysis.

PractiCalc (\$39.95) runs on a VIC-20 equipped with the 16k expansion module. As with most spreadsheet programs, the user can enter mathematic or alphanumeric data in columns on the spreadsheet, label the columns, and define mathematical relationships between items in different columns. The program supports over 20 mathematical operations, including all BASIC functions. Column widths of three to 21 characters are allowed, and numeric data can be formatted as dollars and cents, floating point decimal, or integer. Entries can be edited, deleted, or moved from one column to another, and the spreadsheet can be recalculated at any point. Rows of data can be sorted into alphabetical or numerical order.

PractiCalc 64 (\$54.95) and PractiCalc Plus (\$49.95) are enhanced versions of PractiCalc which run on the Commodore 64 and the VIC-20, respectively. Both offer high- and low-resolution histograms (horizontal bar charts), and data-base functions. The histograms can be instantly generated from numbers on the spreadsheet by pressing a single key, and can be printed along with the spreadsheet on any printer which can be linked to the host computer. The low-resolution graphics mode consists of rows of asterisks, allowing the histogram to be printed even on printers without graphics functions.

The data management functions built into PractiCalc Plus and PractiCalc 64 allow either program to be used as a data base to store and index data entries such as phone numbers, addresses, or sales figures. The user can sort spreadsheet items to arrange data in either numeric or alphabetic order, or can search for a specified data entry. Wild-card characters may be specified in the search routine, so that the program can be instructed to find, for instance, all data entries containing the string of letters “AN,” which would result in its displaying in order of their appearance in the spreadsheet, such entries as “BAND,” “SANTA FE,” and “ANTICIPATED.” Since searches may also be initiated on the basis of a string of numbers, it is possible to search the spreadsheet for particular ZIP codes, sales territories, telephone numbers, or other data.

PractiCalc 64 can be used to generate spreadsheets arranged in up to 100 columns and 250 rows. PractiCalc Plus and PractiCalc can generate spreadsheets of approximately one-third that size on a VIC-20 equipped with the 16k module.

All three programs are available in both tape and disk formats, and the spreadsheet results in each can be printed for inclusion in reports or presentations. The documentation for these programs is straightforward and well written. Users without spreadsheet experience should be able to learn to use the program very quickly, while more experienced users won’t be exasperated by overly simplistic instructions.

FOR MORE INFORMATION: MICRO SOFTWARE INTERNATIONAL, INC., 50 Teed Dr., Randolph, MA 02368.
CIRCLE 493

OFFICE AUTOMATION TOOL LINKS SOFTWARE PROGRAMS TO PERFORM ROUTINE OFFICE TASKS

MicroPro has developed StarBurst, a software tool for building information management systems. The package unites MicroPro programs or links together other programs in order to perform office tasks. It lets managers systematize office routines and create a custom series of menus and help messages. Users of the system can then press a single key from a menu to automate a series of tasks.

No programming is required to use StarBurst for designing an office system. A manager can build a prototype and change it as often as needed. Tasks can be listed as choices on a menu, using a WordStar-like text editor to create menus exactly as they will appear to the user. Commands such as “run,” “check,” “prompt,” and “display,” are built into the customized office system. Managers can provide detailed help for each command, including examples and explanations. The user can also be guided by repeat sequences and conditional logic. One

(continued on page 208)



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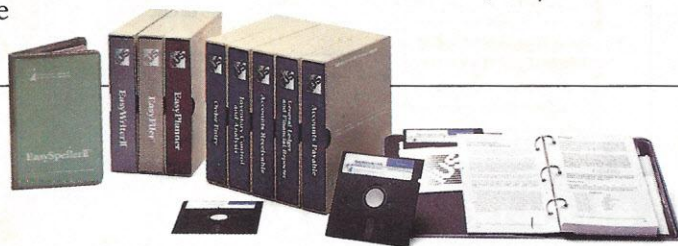
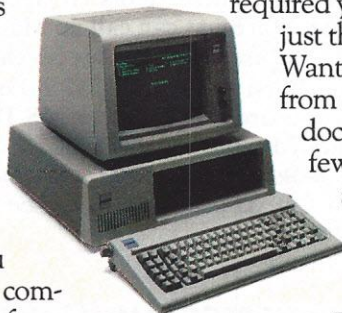
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SOFTWARE OF THE MONTH

(continued from page 205)

or more menus can be linked in various ways and revised at any time. Each menu choice can be supported by up to 100 lines of task commands and customized help. Since changes in the system can be made by the manager without programming, StarBurst eliminates dependence on programmers.

For the manager or systems designer, StarBurst help is available while designing the system. A hard copy of each screen is provided to help track progress in developing the system. When a StarBurst system is customized, a user asks for the starting menu and is guided step-by-step through a task.

Here's how StarBurst can work with other MicroPro products: StarBurst calls on the InfoStar data-base-management system to enter new customer information and revise customer data-base listings. StarBurst then activates the PlanStar financial planning software to update monthly financial reports. Next, WordStar can be used to summarize the reports. Then SpellStar can check for typographical errors. If a customer mailing is required, StarBurst can call up MailMerge through WordStar. The user does all this by choosing product names.

StarBurst runs on CP/M 2.0 or higher, Apple with a CP/M board, PC-DOS 2.0, MS-DOS, and CP/M-86. Its suggested retail price is \$195.

FOR MORE INFORMATION: MICROPRO INTERNATIONAL CORPORATION, 33 San Pablo Ave., San Rafael, CA 94903; (415) 499-1200

CIRCLE 483

RUN NINE PROGRAMS AT ONCE

Designed for new computer users, Memory/Shift from North American Business Systems gives you access to nine programs at once by providing nine partitions for the IBM Personal Computer.

With Memory/Shift booted, you can store any nine programs in computer memory, allowing instant access to any one. You can go from one program to another by hitting a function key, and you can transfer data from one program to another. Say, for example, that you want to move a column of numbers from WordStar into VisiCalc to be added. You mark the area on the screen in WordStar that you want transferred, then enter VisiCalc, and Memory/Shift will enter the information in the location you specify as if you were typing it in. You can then transfer the results back into a text file of WordStar.

Memory/Shift also supports two monitors, allowing you to display two programs at once. You need a minimum of 128k memory and IBM-DOS to run Memory/Shift. The retail price is \$99.

FOR MORE INFORMATION: NORTH AMERICAN BUSINESS SYSTEMS INC., 677 Craig Rd., Suite 202, St. Louis, MO 36141.

CIRCLE 390



ZERO TO MULTIPLANTM IN 5.2 MINUTES. FINANCE OR ACCOUNTING WORKSHEETS FAST.*

SELLING AND ADMINISTRATIVE: BASIC INFORMATION

Enter company name: MODERN FURNITURE

Enter project name: BUDGET PLANNING

Enter Report name: SALES/ADMINISTRATIVE EXPENSES

Description of budget period: 1983

COMMAND: Example Help Load Next Quit Review Save

Enter responses

Press tab to move to command line Export System: expense

Gentlemen, start your computers.

Time: 0

SELLING AND ADMINISTRATIVE: INTERVAL SELECTION

Monthly -

Quarterly -

Annually -

Other -

COMMAND Example Help Load Next Quit Review Save

Type an "x" beside one choice.

Press tab to move to command line

Expert System: expense

Select budget intervals.

Time: 0.5

```
SALES REVENUE

Enter sales revenue for each quarter

1st Qtr 1983    $ 2966000
2nd Qtr 1983    $ 2659853
3rd Qtr 1983    $ 2964081
4th Qtr 1983    $ 3283348

COMMAND Example Help Load Next Quit Review Save

Enter responses
Press tab to move to command line
Export System expense
```

Enter sales revenue.

Time:1.0

VARIABLE SELLING EXPENSES EXPENSES INCURRED
List desired categories by typing in one category name per line.
It suggested responses shown are not wanted, delete them or
replace them with your own preferred categories.

Variable Selling Expenses 1—Commissions
Variable Selling Expenses 2—Other
Variable Selling Expenses 3—
Variable Selling Expenses 4—
Variable Selling Expenses 5—
Variable Selling Expenses 6—
Variable Selling Expenses 7—
Variable Selling Expenses 8—
Variable Selling Expenses 9—
Variable Selling EXPENSES 10—

COMMAND: Example Help Load Next Quit Review Save
Select option or type command letter
Press tab to avoid responses on screen Expert System: expense

Enter selling expenses.

Time: 1.5

	1	2	3	4	5
BUDGET PLANNING - SALES/ADMINISTRATIVE EXPENSES					
		1983		1984	
		Sales	Growth Rate	1st Qtr	2nd Qtr
		Rate	1983	1983	1984
7 SALES REVENUE				2,560,000	2,655,853
8 VARIABLE SELLING EXPENSES					
9 Commissions	1.00		25.60	26,559	26,559
10 Other	1.20		30.72	31,870	31,870
11					
12 TOTAL VARIABLE SELLING			56,320	58,429	
13 FIXED SELLING EXPENSES					
14 Salaries			112,140	112,140	
15 Advertising			100,000	100,000	
16					
17 TOTAL FIXED SELLING			212,140	212,140	
18 VARIABLE ADMINISTRATIVE EXPENSES					
19 Accounting	0.90		23,040	23,903	
20 Commodity Alpha Blank Copy Diskette Print Format Logo Help Inset Lock Move Mail Phone Copies Print Sort Transfer Value Window Internal					
21 Select option 1 or 2 command letter					
RC21 - BUDGET PLANNING				NL	Multiplan TIME

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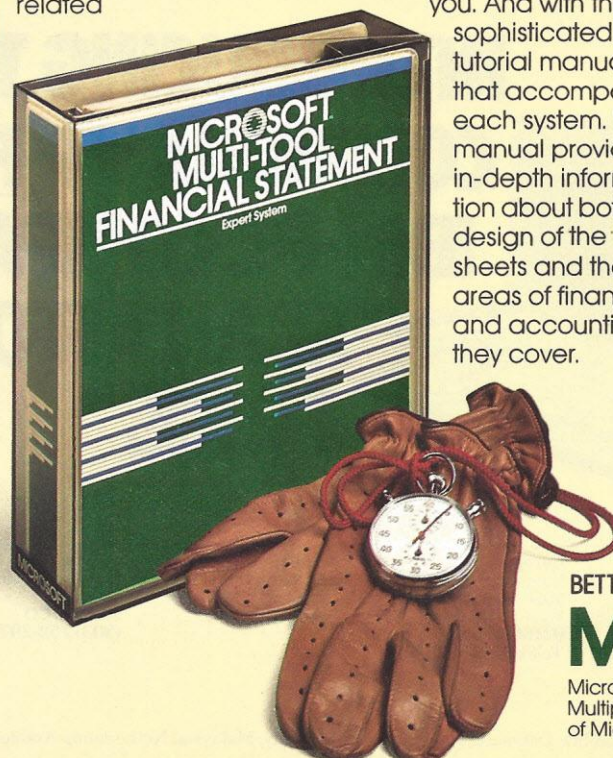
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Today, the Columbia VP portable takes on hundreds of IBM-PC compatible software programs and IBM-PC add-ons or peripherals.

What's more, six other Columbia-supported operating systems are available — CP/M-80*, CP/M-86*, (Concurrent CP/M-86*, OASIS-16* and XENIX* available soon) — stretching the Columbia VP's software compatibility beyond any other personal computer you can buy.

Get started with thousands of dollars worth of software FREE.

Every Columbia VP portable is shipped with fully supported software that will save you thousands of dollars on your initial purchase. That means your Columbia is up

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Perfect Writer™
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Full feature performance at an affordable price.

The Columbia VP portable features an 8088 16-bit CPU, 128K RAM, (additional 128K, optional). 640K in dual disk drives, one IBM-PC compatible expansion slot, one serial and one parallel I/O, IBM-PC-compatible keyboard, and a 9" built-in monitor with graphics.

The best news of all is the price: \$2,995—including software. And

the Columbia is built with lasting value in mind. Rugged single board design plus the flexibility to expand and personalize your Columbia VP.

Made in U.S.A.—supported worldwide.

All Columbia hardware and software are backed by our dealers and distributors worldwide with national service provided by Bell & Howell. Call for the name of the dealer in your area. Let us show you a whole new world of performance and value.

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CIRCLE 98

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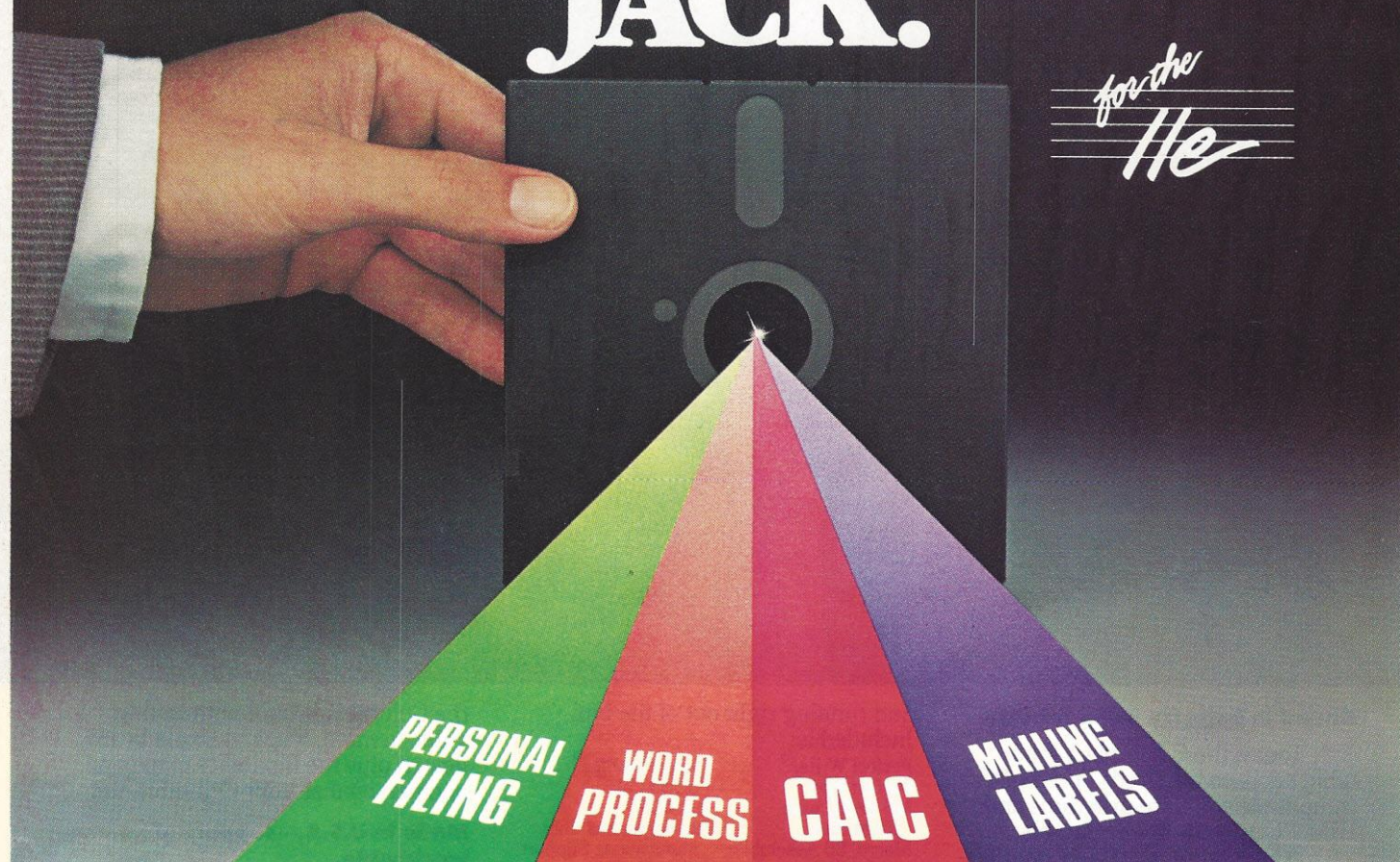
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WILL MAKE YOUR APPLE II THE JACK OF ALL TRADES FOR \$ 179⁰⁰.

Four applications in one.

The Incredible Jack combines the convenience of a personal filer with the power of a calc package. It handles most word processing tasks with ease. Toss in the ability to sort and print mailing labels, and you have a totally integrated, suprisingly easy to use package that does most of what you bought your Apple for.

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The Incredible Jack lets you arrange your information in "records" you design yourself using the computer display. Each record may be as little as a mailing label or as large as 60 sheets of legal sized paper.

Word processing made easy.

With a few simple commands you can

master in minutes, you can create letters, memos and reports. To help you edit, Jack lets you insert, delete, and copy portions of text all with automatic word wrap and flush right margins. The Jack does away with the mind boggling control codes and formatting options of other word processing packages.

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Jack even allows you to build decision making logic into your file. With English language rules and a powerful IF THEN ELSE function, you can instantly calculate complex discount tables, commission plans, contract terms, or tax rates.

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A demonstration of The Incredible Jack Of All Trades may be seen at most computer stores. If your dealer doesn't carry Jack yet, you can order it for \$ 179.00 plus \$5.00 shipping and handling by calling: (800) 645-4513 or writing Business Solutions, Inc., 60 E. Main St., Kings Park, N.Y. 11754.

PRICE EFFECTIVE JUNE 15, 1983.

THE INCREDIBLE JACK.^{T.M.}   

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CIRCLE 132

Help In Finding The Right Software

Tim Shirley had a plan. He wanted to design and build an automated office building with built-in computing capabilities for its tenants. The diversity of the tenants' computing made it necessary for Shirley to search for appropriate, useful hardware and software. Shirley quickly discovered frustration and futility in his task.

"It was a case in which necessity and/or frustration was the mother of invention," he says. "When I began looking for a system which had the broadest base of software for this use, I used directories, since they were the available sources. So I tried to contact the vendors. But to my surprise and dismay, many of the products were unavailable, or the vendors were no longer in business."

Shirley notes, too, the high rate of error in most directories: "It ranges from 40 to 86 percent. That's not exactly what you would call reliable information. And that's also not to say that the publishers are doing a bad job," he says. "The problem is that by the time the directory is actually in print, things have changed." Often, Shirley says, 18 months may pass between the directory's inception date and the time it appears on the retailer's shelf. And by then new companies have entered the marketplace and others have dropped out.

Shirley's experiences made him aware of a vital need for a central source of information on available software. "I decided to do some research and form a data base of my own," he says. "That's when SOFSEARCH was conceived." In 1981, SOFSEARCH became a reality for Tim Shirley, who based his company in San Antonio, Texas.

SOFSEARCH was designed as a

universal software source to provide application software for about 80 different vertical market areas, Shirley explains. "A large segment of it is

offered to the small business user," he says. "About 70 percent of our subscribers are business users or institutions" (continued on page 217)

SOFSEARCH REPORT	
A. SOFTWARE: ABC Business Package - Integrated Accounting System	
B. A PRODUCT OF:	ABC Software Company P. O. Box 1010 Anywhere US 12345 123-456-7890
C. SERVICE AREA:	UNITED STATES
D. PERSON TO CONTACT:	John Doe
GENERAL INFORMATION:	
E. This product is of the following functional category:	ACCTG.--INTEGRATED SYSTEMS
F. It has been developed to serve the following industries:	CROSS INDUSTRY APPLICABILITY
G. This product requires one of the following hardware(CPU)/operating system environments with 48K memory:	
H. TEXAS INSTRUMENTS 990/DS990 MINICOMPUTER SERIES	WANG VS SYSTEMS MICROCOMPUTERS USING CP/M (MP/M) MICROCOMPUTERS USING UNIX NCR MODEL 9XXX SERIES
I. This product is written in the following language(s):	COBOL
J. This product is of the following installation class:	USER OR VENDOR INSTALLED
K. As of 07-09-82, our last review date, this product was being used by the following number of entities:	101 - 200
L. PRICING INFORMATION:	\$1,200 Per Module.
M. REF. NO.:	34590

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* SOFSEARCH (TM) AND P.O. Box 5276 *	
* PROPRIETARY San Antonio, TX 78201 *	

This is an example of the one-page, objective, software reports that San Antonio-based SOFSEARCH, a software information source, provides to its subscribers.

IF YOU'RE CONFUSED ABOUT BUYING A PERSONAL COMPUTER, HERE'S SOME HELP

Computers come in two parts.

One part is the "hardware," the machinery itself. The other is the "software," which tells a computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything. And vice versa. You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember it's the software that tells the computer what to do), it makes good sense to pick the software first.

Start by making a list of the things you want the computer to do. Possibilities include word processing, inventory control, accounting, graphics, recordkeeping—you name it, there's probably software that does it.

Next take your list into a computer store and ask the salesperson to demonstrate software that will do the things you want.

Even though you'll need a computer for the demonstration, keep in mind the computer is just a vehicle. The software is the driver. Once you've decided on software, picking the rest of the computer system will be that much easier.

The simpler the better.

Some people will tell you that software has to be complicated to be powerful. Nothing could be further from the truth.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you want to do without getting in the way.

Good software keeps the complications in the computer, where

they belong. And keeps the capability at your fingertips. It's that simple.

Simply see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask your friends who have them.

Or look at all the sales literature you can get your hands on.

But as helpful as that can be, there's no substitute for a live demonstration.

When you do go shopping, we recommend you take a look at the PFS® Family of Software.

Designed the way we think a software family should be: simple, straightforward and powerful.



Currently there are four software packages in the family: PFS:WRITE, PFS:FILE, PFS:REPORT and PFS:GRAPH, with more on the way. Here's a little more about each of them.

PFS:WRITE. The simplest way to get your message across.

PFS:WRITE is ideal for people who want to make their writing time more productive. It displays what you write on your computer screen so you can make revisions as you compose.

With WRITE, you can correct misspellings or substitute one portion of text for another, with just a few keystrokes.

And when you're through revising, WRITE shows you "on-screen" just how your document will look when it's printed. So there are no surprises afterwards.

WRITE also works with most popular software programs, including the PFS Family of Software.

This feature allows you to add names and addresses from mailing lists to generate form letters. Or combine columns of numbers or graphs with your text.

PFS:FILE. The simplest way to get organized.

FILE is basically a paper filing system without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

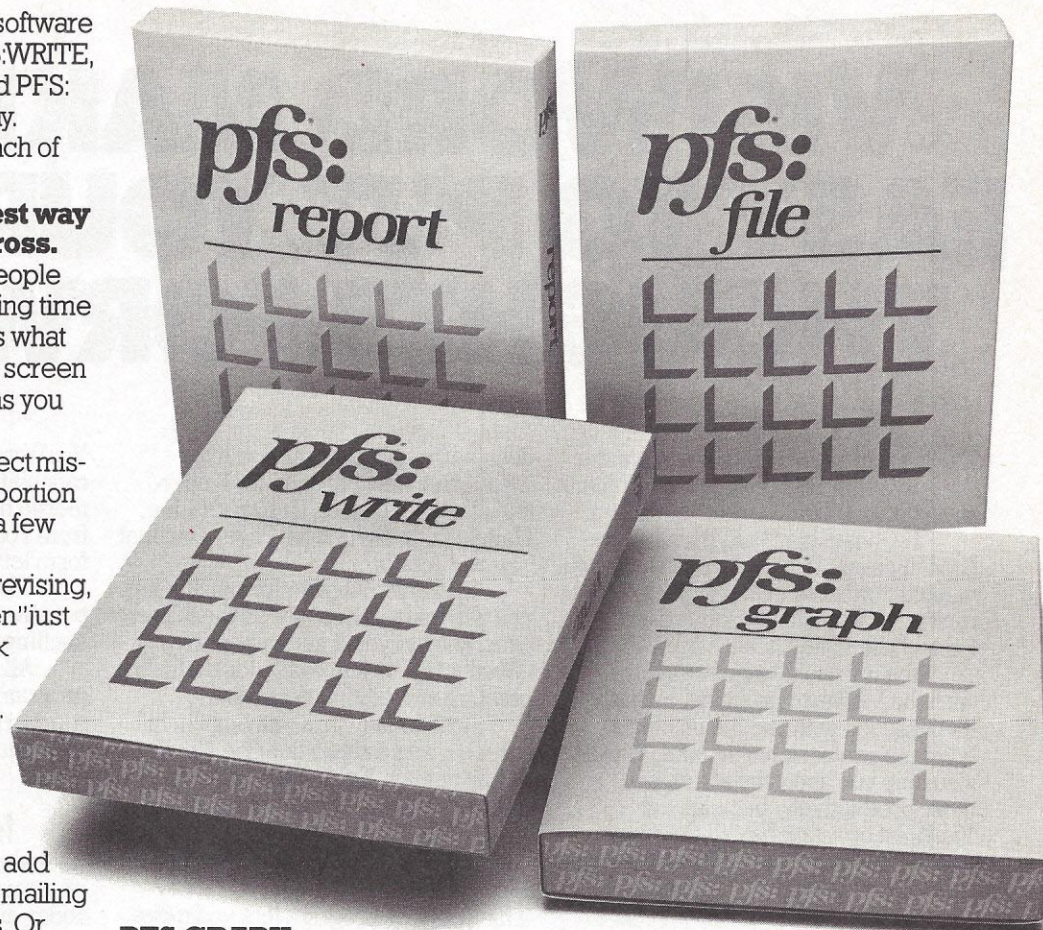
With FILE, you arrange your information on a "form" you design yourself. And when you need to track something down, FILE sorts through your records electronically. It lets you retrieve information in a variety of ways so you can be as selective as you want.

PFS:REPORT. The simplest way to sum it all up.

REPORT is a powerful analysis tool that works with FILE.

REPORT sorts through your files and retrieves the information you're looking for. Then assembles it all into one report, so you can analyze, plan and make better-informed decisions.

REPORT is also good at math. It quickly sorts through columns of numbers and performs calculations, so you won't have to.



PFS:GRAPH. The simplest way to spot trends.

GRAPH is ideally suited for professionals who need charts or graphs in a hurry.

All you do is specify the kind of graph or chart you want and enter the information. GRAPH does the rest.

GRAPH transforms columns of facts and figures into pie, line and bar charts so you can spot trends quickly and make better-informed decisions.

GRAPH works with PFS:WRITE, PFS:FILE, VisiCalc® files or data entered directly into the computer. And supports most popular printers and plotters.

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It's free. And all you have to do to get one is return the coupon below or see your participating PFS dealer.

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VISIWORD MAKES IT EASY TO PUT YOUR BEST THOUGHTS FORWARD.

The better your writing is, the greater the opportunities are to clearly communicate your thoughts, sell your ideas.

The VisiWord™ program for the IBM® Personal Computer can help you make the most of every writing opportunity. It's available for both the IBM PC and the IBM XT with hard disk.

You'll write more effectively with the VisiWord program, because it's designed with the needs of the business professional in mind. It will also help you and your staff work more productively, because the VisiWord program has all the word processing functions your secretary or assistant needs.

You'll find the VisiWord program easy to learn, simple to use. And everytime you use it, you'll be pleased by how much less effort it takes to produce memos, letters, proposals and reports that reflect your very best efforts.

Writing, editing and printing your thoughts are done in a single process that's fast — without waiting for typing and retyping. And your results may be even more professional-looking because what you see on your screen is exactly what you get in your final printed result.

Easy to learn.

You're ready to write the instant the program is loaded. A simple, uncluttered screen display presents a multiple choice "menu" of functions.

You simply choose which function you want to use and the on-screen prompts tell you how to use it every step of the way.

A QuickStart™ course is included to get you or anyone on your staff producing letters and reports within 30 minutes.

Even easier to use.

There are no hard-to-use "control" characters. A single keystroke selects all primary program functions — Insert, Delete, Copy, Move, Find/Replace, Storage and Print.

The most-used editing functions are also easy-to-use, because they're

done with a single Function Key. These include Center Line, Underline, Delete, Delete To End Of Line, Undelete, Indent, New Page, Decimal Tab and Again.

Dynamic full page formatting lets you see instantaneously on the screen exactly what you'll get on paper.

"Word wrap" is automatic for both creating and editing documents.

Additionally, time-saving "help" screens, and a clear, concise User's Guide in plain English give you the assistance you need at a glance.

More powerful editing with much less effort.

The VisiWord program lets you move, copy, or delete columns of information as well as paragraphs, and even pages, simply and easily.

It helps you make your documents look more professional by automatically formatting and numbering each page, and adding headers and footers if you wish.

And the VisiWord program's split screen windowing function lets you see two documents at once, and take parts of one and incorporate them into the other.

You can even change your mind about a change — the "undelete" feature recalls lines of text you've deleted.

Edit one document while you print another.

The "print spooling" feature of the VisiWord program will save you important time by letting you print out one letter-perfect document at the same time you're creating another on your screen.

VisiWord becomes even more powerful with other VisiSeries™ programs.

Budgets and plans created with your VisiCalc® program can be automatically included in your

VisiWord report, using the windowing capability. Or you can automatically merge names and addresses selected from your VisiFile™ program into a form letter.

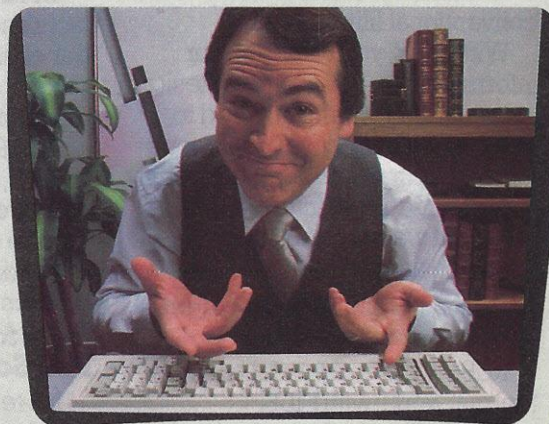
The VisiSpell™ program will proofread and help you correct spelling errors.

All total, there are nine VisiSeries programs to help you work more productively with your IBM Personal Computer now. And in the future.

VisiWord leads to Vision™

To make sure that the VisiWord program helps your word processing today and tomorrow, we're making it an upgradable part of our revolutionary VisiON integrated software system of the near future.

Discover how using the VisiWord program will make it easy for you to put your best thoughts forward. See it at a computer store near you, or write our Customer Service Department, 2895 Zanker Road, San Jose, CA 95134.



VisiWord!


VISICORP™

(continued from page 213)

tions. And 20 percent of them are CPAs or computer consultants who use the service to provide information for their clients. Computer retailers make up the remaining 10 percent. They use SOFSEARCH to identify software—often to close the sale of a personal computer.”

The unique thing about SOFSEARCH is that it's not a publication; yet, at the same time, the user doesn't need on-line communication to use its services. “We're sort of a hybrid between a publication and a data-base service,” Shirley explains. “We service the entire world, with close to 10,000 vendors included. Once we identify a software house, we send out a questionnaire. Then we correspond with the company on a regular basis, in order to keep up to date. At any given time, our data-base information is no more than six months old,” he says.

The updating process is relatively simple to implement, yet absolutely necessary in order to establish and maintain the integrity of the service company. During the process, the vendor is given every opportunity to respond to SOFSEARCH's inquiries. “If the vendor doesn't respond, we simply delete his product,” says Shirley. “We don't charge the vendor—but we do require his cooperation.”

“We have a huge data base—the largest of its kind, for all working environments,” Shirley notes. “Obviously we purchase every publication on the market and cross-reference in order to get lists. Our research staff reviews approximately 200 publications each month.” This continual cross-checking and updating process reduces the error rate considerably, according to Shirley. He claims his error rate is no more than 10 percent, which, he says, is “not perfect, but beats the devil out of the error rate of the directories.”

There are three options for users of SOFSEARCH information base.

The first category of use is the subscription which, for \$175 entitles the user to five reports or five software searches, along with a manual, user's guide, and evaluation checklists. “We assume a limited amount of expertise by the subscriber,” says Shirley. The reports are one-page, objective reports on each product requested. “We don't evaluate products,” Shirley notes. If a user needs more than the five reports included with his subscription, he pays \$35 for each additional one.

The second option is the single search report. Non-subscribers can get a one-time, single search report for \$60. Obviously, if you find yourself requiring three or more reports during the year, subscribing is the economical way to go.

Sofselect reports constitute the third option. The information selection process is different for this option. The search is done by function, machine environment, and industry activity. Sofselect lets people who don't yet own a personal computer scan the entire software market for their particular application. The criteria are the same as for options one and two, except for the machine environment. In this case, you can search for a range of systems, since you have none yet. Sofselect reports cost \$95 for subscribers, and \$115 for non-subscribers.

SOFSEARCH's impact on the hardware industry has been great, says Shirley. “As a matter of fact,” he says, “in 1982 we had a significant impact. If you remember the Apple ads with all those software listings, we provided those listings. In return, we got a footnote credit in the ads. Not only did it help Apple sell computers, but it helped us sell subscriptions.”

There's more in the future for SOFSEARCH, according to Shirley. “SOFSEARCH is only our first-phase service,” he says. “We're going to be moving into an on-line locating service. For example, a computer

dealer could call up our data base on his terminal and have information right away.” Right now it takes 48 hours to get the information to the subscriber. “And at that time we'll be going to an expanded product record. There's also something else,” Shirley adds, “and that's in the area of reviews. We'll be providing reliable software evaluations, but that's for the future.”

Kids, Computers, And Creativity

There's been a great deal of discussion lately about the best age at which to begin the computing experience. At the Small Wonder Nursery School in suburban Upper Saddle River, N.J., this discussion is moot. There, kids age two to six are using the school's Commodore PETs and Apples regularly and successfully.

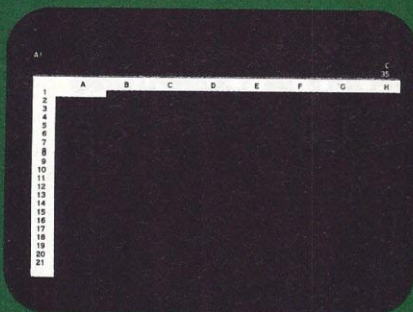
School director Jean Senior introduced computers into Small Wonder's curriculum nearly two years ago, because she believed they would not only enrich the preschool learning program, but would also be a unique feature of her school.

Senior thought parents in this affluent community might select Small Wonder as the school for their children because it offered the opportunity to learn computing. She was right—enrollment swelled. But this move had some surprising side effects. Traditional learning aside, the kids have found some truly creative uses for the school's computers.

It was “the fabulous five,” as Senior affectionately calls them, who decided to create a computer robot on the video monitor. Danny, Brian, David, Jessica, and Daniel instigated the project after they watched a fellow classmate create a house on his computer screen. “These are very precocious kids,” says Senior.

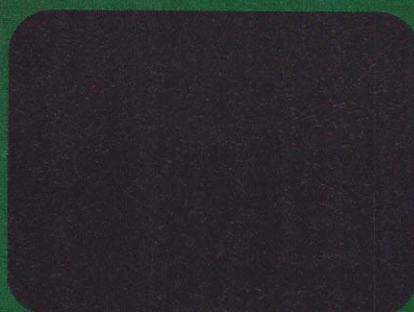
(continued on page 222)

VISICALC*



INTERACTIVE ELECTRONIC
WORKSHEET

YES



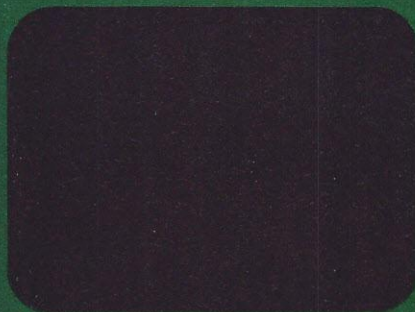
ON-LINE REFERENCE GUIDE

NO



"NAMING" OF CELLS
OR AREAS

NO



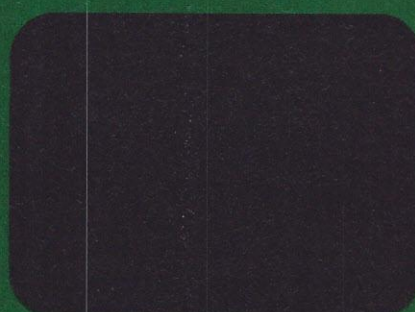
PLAIN ENGLISH PROMPTS

NO



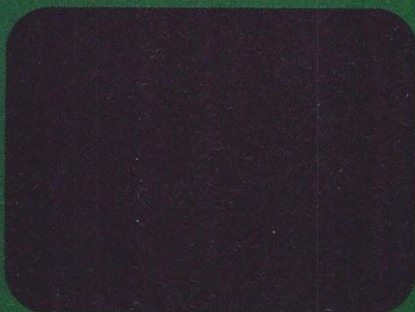
INDIVIDUAL COLUMN
WIDTHS

NO



EXTENSIVE FORMATTING
CAPABILITIES

NO



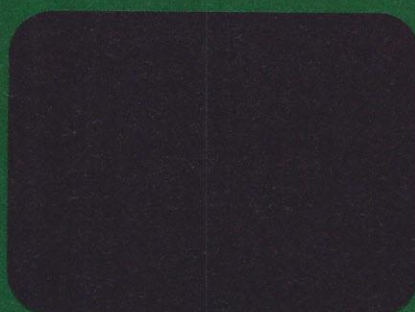
PROTECTED CELLS

NO



MULTIPLE, LINKED
WORKSHEETS

NO



SORTING CAPABILITY

NO

VisiCalc[®] was a swell idea for then.

The next generation. First generation electronic worksheets were a good idea. They were early software management tools that could eliminate a lot of hours with a spreadsheet, calculator, pencil and eraser. Enter Multiplan, the next generation electronic worksheet that's as easy to use as it is useful.

Make comparisons. Compare Multiplan to any of the earlier electronic worksheets. We've given you some "prompts" above.

Compare learning time. Multiplan's tutorial book brings you up to speed. Fast. But Multiplan doesn't stop there. Multiplan's On-line Reference Guide gives you instant help if you have questions. It knows where you are in Multiplan and offers information related to your problem, right on the screen.

Compare ease of use. All Multiplan prompts are full length words or phrases. And Multiplan provides "naming," the ability to assign a plain English name to any

cell or area. "Gross Profit = Sales—Cost" rather than "AA44=AZ23—BK154." Which means you can work more intuitively. And faster.

Compare utility. Multiplan lets you link related worksheets so that information is transferred between them automatically. For instance, you can keep regional sales forecasts on separate sheets but link them with your overall company forecast. Then, just change the forecast for any region, and the company forecast sheet is updated automatically. Something you can't do with first generation worksheets.

Compare reports. Not just the work you can do, but the way you can present it. Multiplan's flexible formatting options allow you to produce presentation-quality reports. And its sorting capability lets you sort by either alphabetic or numeric order. So a sales manager who normally lists sales regions alphabetically could sort by amount sold and conveniently rank by sales performance. The

*Based on features in releases VC-202B0-AP2 and VC-156Y0-IBM of VisiCalc on the Apple II and IBM-PC respectively.

MULTIPLAN

**NOW AVAILABLE
FOR THE IBM
PERSONAL COMPUTER**

COMMAND OVERVIEW

The Multiplan worksheet consists of a grid of up to 63 columns in width and 255 rows in length. The screen has one or more windows into the worksheet and an area showing command messages and status lines. The message line suggests the action to be taken or explains errors when they occur. The status line displays coordinates of the active cell, its contents, percentage of storage remaining, and worksheet name. There is a highlighted active cell on the worksheet. The highlight can be moved around by pressing the direction keys. The same keys are also used for scrolling the contents of windows. The Ctrl-PgUp keys may be used to go to row 1 column 1 quickly.

The command menu offers a choice of commands. To get going you need to:

1. Select an active cell. The direction keys may be used.
2. Select a command. There are two ways to do this. You can mouse the highlight to a command word using the F8 and F10 keys and then press Enter, or type the first letter of the command.

HELP: Resume Start Next Previous

Applications: Commands: Editing: Formulas: Keyboard

Select option or type command letter

100% Free Multiplan: PROFIT1

INTERACTIVE ELECTRONIC WORKSHEET

YES

ON-LINE REFERENCE GUIDE

YES

"NAMING" OF CELLS OR AREAS

Region 1 Profit Forecast

	Jan	Feb	Mar	Apr	May
Region 1 Sales	2000	2200	2420	2662	
Region 1 Cost	1300	1430	1573	1730.3	
Region 1 Gross Profit	700	770	847	931.7	

FORMAT WIDTH in chart or default: 23 column: 1 through 1

Enter a number or d for default

97% Free Multiplan: PROFIT5

PLAIN ENGLISH PROMPTS

YES

INDIVIDUAL COLUMN WIDTHS

YES

EXTENSIVE FORMATTING CAPABILITIES

YES

Region 1 Profit Forecast

	Jan	Feb	Mar	Apr
Region 1 Sales	\$2,000.00	\$2,200.00	\$2,420.00	\$2,662.00
Region 1 Cost	1,300.00	1,430.00	1,573.00	1,730.30
Region 1 Gross Profit	\$700.00	\$770.00	\$847.00	\$931.70

Growth Rate = 10.0%

Cost Factor = 65.0%

LOCK FORMULAS

Enter Y to confirm

97% Free Multiplan: PROFIT7

PROTECTED CELLS

YES

MULTIPLE, LINKED WORKSHEETS

YES

SORTING CAPABILITY

YES

Multiplan™ is a great idea for now.

result is a more meaningful and useful presentation of data.

Compare availability. With Multiplan, you're not limited to a single range of computers. Multiplan is available for Apple® and for microcomputers that run MS™-DOS, XENIX™, or CP/M-80® operating systems. Multiplan supports both 40- and 80- columns on the Apple II.

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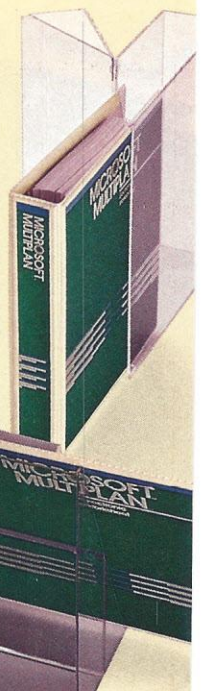
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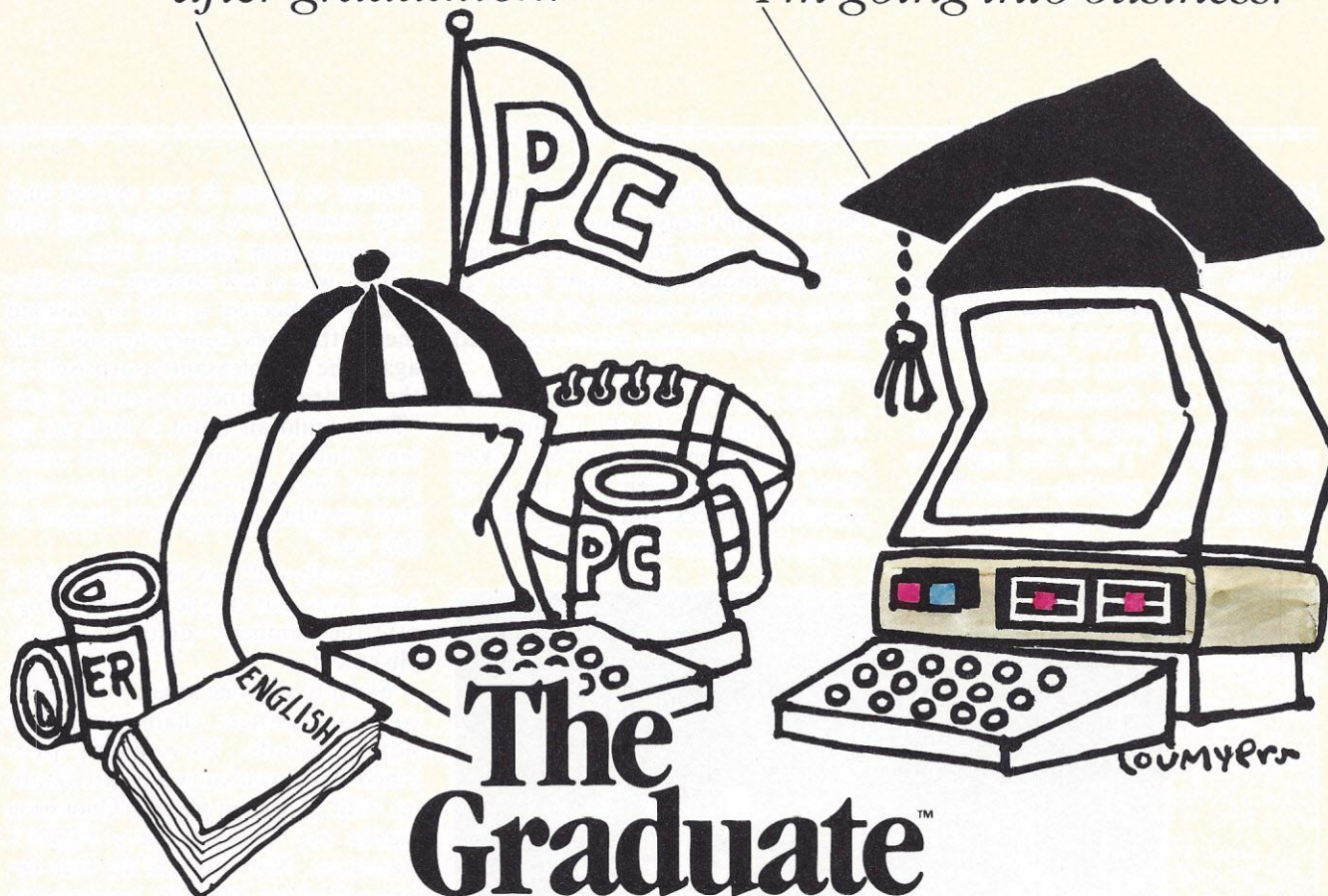
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CIRCLE 114

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*Computer Aided Programming/for Computer Automated Business.

(continued from page 217)

"They're very verbal, very creative, and very motivated."

When they asked for help in creating their robot, Senior thought, "What are they truly going to learn from the experience of drawing a robot?" She soon found out.

"They used graph paper first," explains Senior. "That's the way they decided on the spacing—they charted it out." Many concepts are used in the charting exercise—centering,

did, the robot's legs were shortened—the kids didn't leave enough space on the graph paper for long legs. They decided through discussion that redoing the robot was out of the question—their attention spans were tried enough.

Next it was time to transfer Shorty to the computer. In the preliminary discussions, Senior says, "We talked about how the screen is made up of these little spaces, and how the cursor moves from space to space."

plained to them. It was agreed that they would have to begin with 100 and count from there by tens.

This was a new concept—one that Senior suspected would be beyond these little ones' comprehension. But again she was pleasantly surprised, as the children learned to count by tens. "They could all count a little bit by tens, but it became a whole unexpected lesson in this instance—one they wouldn't ordinarily be taught at this age."

Not only did they learn this, but a bonus was that they learned to recognize the numbers—quite an accomplishment.

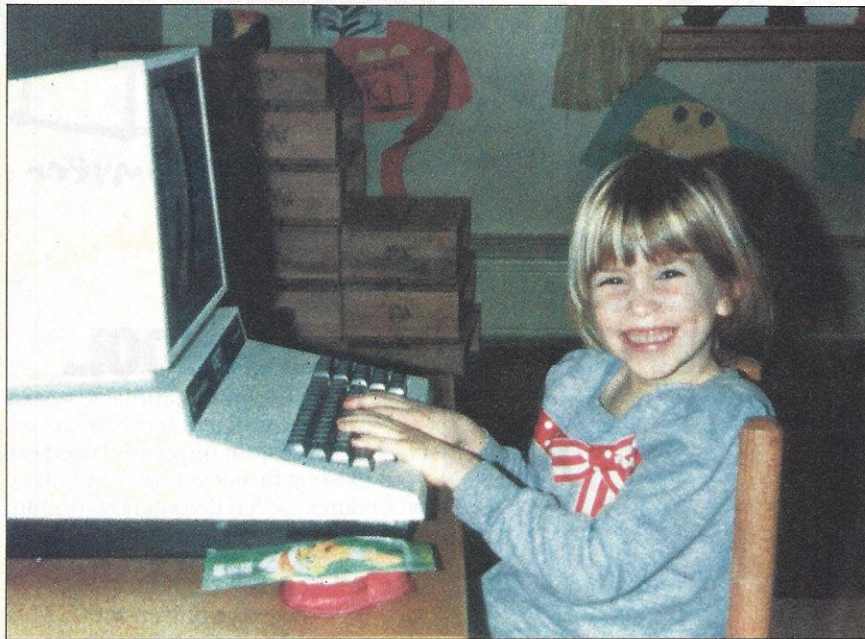
Math is only one area in which the computer project challenged these young minds. How many preschoolers do you know who are familiar with quotation marks? Quotation marks are used in every PRINT statement. Not only did the kids become familiar with the punctuation visually, but this triggered an elementary grammar lesson—limited, to be sure.

The necessary use of words like delete, rewind, and return increased the children's vocabulary. The word PRINT, originally presented as a symbol, quickly became a word the kids could recognize, spell, and read. Concepts such as too little, too big, half, whole, curved, straight, and angle were also presented. The learning possibilities were endless. "Learning has to be meaningful to be worth anything," says Senior. "These kids absorbed it all."

The Shorty project took about a week to complete. "We worked together for 15 to 25 minutes each time," says Senior. Although other children were curious and interested, the fabulous five discouraged their interest.

"Actually, the authors were very protective of their project, and enjoyed showing off a bit. Now they're more interested in programming—not so much graphics," Senior says.

(continued on page 227)



At the Small Wonder Nursery School, kids age two to six are using Commodore PET personal computers constantly—from 8:30 in the morning to 3 in the afternoon.

spacing, adding, subtracting, counting, and even approximating.

Getting preschool-age children to make decisions, such as the shape of the robot's head and eyes, was a tremendous achievement, Senior notes. Discussions were spirited and sometimes led to arguments. But in the process, children practiced important social skills like discussion, trial and error, and compromise.

Of course things don't always work out as accurately as planned. "Shorty" became the robot's name because with all the planning the kids

"It was very tedious, transferring the drawing from paper to screen," says Senior. "And it certainly wasn't completed in one session, due to the limited attention spans of children of this age. But this, too, was a learning experience—an ongoing project. We had to save the incomplete Shorty on tape until we met for another session at the computer." Most of the children are familiar with tapes, Senior says, since they have tape recorders at home.

When the children approached the computer, the line numbers were ex-

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Power for PC DOS ..	75	56
Applied Software Technology		
QBASE	189	143
Versaform	389	259
Aptek		
Epson to Prism		38
PC Ticker Tape		22
Rainbow Writer		125
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dBASE II	[5] 700	398
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Proofreader 50K	50	38
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Powertext	399	369
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Championship		
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COPY II PC	40	35
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PC Tutor	80	60
Comshare		
Financial Modeling	325	264
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Desk Organizer		245
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Condor 1	295	189
Condor 3	650	398
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Plus	150	99
Property		
Management	495	359
Datamost		
Real Estate Inves.		
Prg	130	95
Denver Software		
Easy	750	562
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WORDIX	195	149
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dUTIL	99	59
Quickcode	295	185
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Friendlyware	50	38
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Howard Software		
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Analyzer	250	185
Tax Preparer 1983 ..	250	185
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Hour	100	74
IUS		
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Easy Speller 2/		
Legal	350	229
Easy Speller 2/		
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Easy Writer II	350	229
Financial Mgmt		
(AR/AP/GL)	1495	1019
AP	595	389
AR	595	389
GL	595	389
Inventory	595	389
Order Entry	595	389
Payroll	595	389
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Graphmagic Combo		
.....	150	119
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List	250	184
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processor	500	367

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Tax Manager	250	188
Micro Pro		
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Mailmerge	250	165
Reportstar	250	231
Spellstar	250	165
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Word/Spell	[4] 695	426
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Wordstar	[4] 495	327
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Timekeeping	750	385
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Statpak	495	369
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Style		109
The Word Plus	150	112
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PFS: File	140	105
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The Creator	300	224
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Versawriter	25	19
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CBASIC 86	200	150
CIS COBOL 86	800	600
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Level 2 COBOL 86 ..	1600	1200
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Pascal MT + 86		
with SPP-86	600	450
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Benchmark Mail		
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Dev System	950	713
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Analyst	250	188
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AR	1250	790
GL	1250	790
Inventory	1250	790
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PR	1250	790
Q Sort	100	75
Woolf		
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Zork II	40	30
Zork III	40	30
Omic		
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Draughts	35	26
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Crossfire	30	22
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Fleece	40	29
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Microsoft		
64K RAM	350	249
64K RAM Chip Set ..	175	139
128K RAM	525	379
192K RAM card	700	499
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CPA #1,2,3,4		
(all 4)	1000	609
CPA #1-GL	250	159
CPA #2-AR	250	159
CPA #3-AP	250	159
CPA #4-Payroll	250	159
CPA #5-Property		
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FCM (First Class		
Mail)	100	75
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Crane

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Creative Curriculum

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Courseware	99	75

Dakin 5

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keeping System	395	299
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Depreciation		
Planner	395	299

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Accountant with		
DBCalc	149	112
DBCalc		20

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Writer	40	29
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Pascal Programmer		
	296	223
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Algebra 2	40	30
Algebra 3	40	30
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Rendezvous	40	30
SAT Word Attack	49	37
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80 Column	150	108
Piewriter/Standard	150	108

Hayes

Micromodem II		
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CRAE	40	30
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Analyzer	195	146
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Transforth II	125	94

ISM

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Data Link	100	75
Link Disk	70	51
Link Index	195	149
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Link Video	55	42

LJK Enterprises

Data Perfect	100	78
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Visifactory	75	54
Wall Streeter	300	216

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(TASC)	175	119
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(ADIOS)	250	194
Time Manager	150	116
Tutor II	25	19

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Dataplot	60	43
Elementary math	40	29
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Office	125	94
Supertext		
Professional	99	74
The Voice	40	29

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Locksmith	100	75

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PBL

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Char Set	20	15
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Apple Tablet	120	86
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System	70	50
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Special Effects	40	30
Special Effects		
Apple Tablet	70	50

Phoenix

Zoom Graphics	50	38
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Program Design

New Step-By-Step	80	58
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Dev Program	650	488

Sensible

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Struc. BASIC	40	30
Best	40	30
Bug, The	50	32
Build Using	30	23
Disk Organizer	30	23
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Epson	40	30
Image Printer		
Letter Qual	40	30
Image Prtr NEC/		
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Sensible Speller		
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Sens. Speller		
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Screenwriter		
Professional	200	149

Silicon Valley

Dictionary	125	94
List Handler	90	68
Word Handler	199	145

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Editor	100	75

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	250	188
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& Runtime	225	169
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AR	395	289
GL	395	289
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Payroll	395	289
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POS	395	289
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PFS: Graph	125	94
PFS: Report	125	94

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Data Capture/		
Smarterm	90	65
Data Capture/Videx	90	65

Data Capture/		
Super Serial	90	65
Data Capture/		
Superterm	90	65

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Electronic Price		
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Sys (Prof)	179	129
Graphics Proc.		
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Utility Pak 2	99	65

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Data Reporter/		
Hard Disk	220	158
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80 Col Preboot		
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Videoterm Utilities		
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Visicalc Mem Ex		
w/Preboot	89	67

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CP/M-80

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Adventure International		
Adventures		
1-12 (Req Z80)	129	97
ATI		
Power for CP/M	75	54
Anderson-Bell		
ABSTAT	359	
Artificial Intelligence		
Dental (PAS-3)	995	749
Medical (PAS-3)	995	749
Ashton-Tate		
Bottom Line		
Strategist	400	279
dBASE II	700	398
dBASE II w/User's		
Guide	729	419
Aspen Software		
Grammatik	75	56
Proofreader	50	38
Balances		
BOSS Fin. Acctg		
System	2495	1496
Byrom Software		
BSTAM	200	149
BSTMS	200	149
Caxton		
Cardbox	245	177
Comm soft		
Roots/M	195	142
Computer Control		
FABS-BTree File		
Access	195	146
Ultrastor II	195	146
Computer development		
Image	495	356
Comshare		
Planner Calc	99	74
Target Application		
Guide	50	38
Combo Pak	125	94
Condor		
Condor 1	295	189
Condor 3	650	398
Designer Software		
Palantir	425	319
Dictronics		
Random House		
Thesaurus	150	113
Digital Research		
Access Manager	300	225
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Display Manager	400	295
MAC	90	75
Pascal MT+	350	262

Pascal MT+ with		
SPP	500	395
PL/180	500	375
SID	75	63
SPP	200	150
ZSID	100	88
DJR Associates, Inc.		
FMS 80	995	625
FMS 80-1	495	312
FMS 80-2	495	312
Ecosoft		
Microstat	295	248
Microstat 3.0	395	320
Epic		
Supervyz	150	94
Faircom		
Micro B+ (CBasic)	260	211
Micro B+ (Other)	260	211
Fox & Geller		
dGRAPH	295	195
dUTIL	99	59
Quickcode	295	195
Quickscreen/		
CBasic	149	125
Quickscreen/		
dBASE II	149	125
Quickscreen/		
FMS-80	149	125
Quickscreen/		
MBasic	149	125
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Zork III	50	38
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Ithaca Intersystems		
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Pascal Z	450	375
Pascal Z & BZ	650	542
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Spellbinder	495	281
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Final Word	300	223
Mince	175	139
Metasoft		
Benchmark Mail		
List	250	184
Benchmark		
Wordprocessor	500	367

Micro Pro		
Calcstar	145	96
Datatar	295	195
Infostar	495	327
Mailmerge	250	165
Reportstar	350	231
Spellstar	250	165
Supersort	250	165
Word/Mail	695	426
Word/Spell	695	426
Word/Spell/Mail	845	558
Wordmaster	150	99
Wordstar	495	327
Microsoft		
BASIC 80	350	252
BASIC Compiler	395	296
COBOL 80	750	562
FORTRAN 80	500	360
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dBASE II w/User's		
Guide	729	419
Digital Research		
Pascal MT+ 86		
w/SPP-86	800	600
XLT 86	150	132
Wolf		
Move It	150	99

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11MB Hard		
Disk	[10]	3295 2695
20MB Hard		
Disk	[10]	4295 3495
Daisywriter		
Printer	[10]	1395 1235
Hayes		
Chronograph ...[5]	249	199
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(continued from page 222)

"They're more involved in spelling, writing, and reading."

What about the computers? Can they withstand the kind of heavy-handed treatment these little ones dish out? At Small Wonder, the computers are in use constantly, Senior says, from 8:30 a.m. to 3 p.m. daily. "I haven't had a service call yet," she says.

"We have the computers on rolling carts, making them accessible to all the children, in all locations in the school. I designed the carts myself," Senior continues, "so that they're at a child's table height."

Since the Upper Saddle River public school system has a computer-literacy program beginning in kindergarten, the children who have attended Small Wonder have an edge when they start school. "I chose the same computers for my school so the transition would be natural and easy for the kids," says Senior.

"I think kids think logically—they don't frustrate themselves by doing what's too hard for them," Senior comments. "The computer is a wonderful tool for this. Every child can work at his own level and excel. Every child who has used it has benefitted."

Computers Sail The Seven Seas

One would think that the last thing a lifelong computer scientist would want to do on his vacation would be to lecture on computers. But that's exactly what Arthur Samuel did when he taught computing to passengers on the cruise ship Rotterdam last January.

It was in the fall of 1982 when Samuel, adjunct professor of computer science at Stanford University, first approached Holland Cruises Inc., and offered to teach personal computing aboard the Rotterdam's 62-day round-the-world cruise.

"They were very enthusiastic," recalls Samuel. A few months later, Samuel was bound for faraway places with an IBM Personal Computer at his side.

The 81-year-old professor has been associated with computers since his student days at MIT in the 1920s. He spent 18 years at Bell Laboratories in the era when computers were still in the beginning stages—"I was a vacuum tube man," he says. Three years of teaching at the University of Illinois followed, then 17 years at IBM. Since his retirement 17 years ago Samuel has been at Stanford, where he is mainly engaged in research.

On the Rotterdam cruise, Samuel instructed about 100 passengers in the fine art of computing, giving one-hour lectures in one of the ship's lounges. The personal computer he used was donated by IBM and software packages were provided by various manufacturers.

The Rotterdam cruised from New York to Los Angeles, to Honolulu, Hong Kong, Shanghai, Singapore, Sri Lanka, and Bombay. It went on to three ports in Egypt, Haifa, Naples, Cannes, Tangiers, Gibraltar, Lisbon, Florida, and back to New York. Samuel did most of his teaching during the nine days between Honolulu and Hong Kong, spending the rest of the cruise as a tourist.

Samuel began his first lecture with a review of the history of computing, asking questions along the way "to size up the audience," which mainly consisted of retirees. In later talks, Samuel covered programming, the ways in which personal computers differ from mainframes, and some of the different applications for personal computers.

He must have made some impact on his pupils—several people went ashore at Hong Kong and bought personal computers, he says.

But for the most part Samuel found a different type of student on board from the ones he sees in the college classroom. While some of his

shipboard audience seemed to grasp the material, others asked questions following a lecture "which showed that they hadn't understood a word I'd said!" he laughs.

"There was a lot of interest in computers, but most of the people didn't have the perseverance to learn to use them. They liked to say 'Oh, aren't computers marvelous.' But most of them were still rather in awe of the thing."

Since there was no room in the ship's lounge to set up the IBM Personal Computer for demonstration, Samuel had it installed in his own small cabin. The crew extended and enclosed his desk to prevent the computer from sliding around. Samuel took in small groups of passengers to show them programs and give them a chance to get their hands on the computer.

Samuel tried to bring along software which would spark a novice's interest in personal computing. "I tried to intrigue people who knew very little about computers," he says. He brought a dummy income tax program he'd written using VisiCalc along with several numerical programs he had written, and another program which worked with a random number generator to let people make their own mazes, each one different.

The experience of being an instructor on a world cruise wasn't a new one for Samuel. He had been a passenger on the Rotterdam in 1971 with his late wife, teaching the Japanese game "GO" to fellow passengers. This time, Samuel found that being a featured lecturer made it easier to meet people than it would have been had he been an ordinary passenger. His name appeared frequently in the ship's daily bulletin, and he found that other passengers went out of their way to talk with him, making him a celebrity of sorts.

In fact, between the lecturing, and the three to four hours a day he spent

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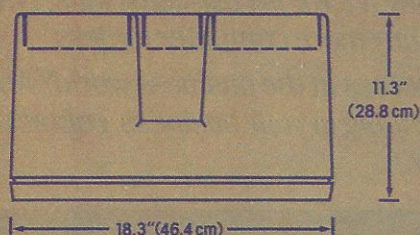
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Serial Port	RS 232C* RS 423*
Parallel Port	Centronics/IBM compatible*
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Acoustic Cups	Uses internal modem
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Carrying Case	Attractive case with accessory pockets
Multiplan[†]	Hyperion enhanced
123[†]	Hyperion enhanced
IN:SCRIBE	Word processor

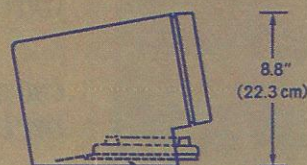
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(continued from page 227)

answering questions and demonstrating the personal computer in his cabin, Samuel ended up spending perhaps a little more time computing than he would have liked. "It did keep me from doing some of the things I would have liked to have done."

Athletes Get Immediate Feedback On Strength

Athletic competition at the international level requires a level of excellence achieved by long and intense training. To prepare American athletes for Olympic competition the U.S. Olympic Committee is using personal computers to measure strength and other capabilities at its national training center in Colorado Springs, Co.

The sports medicine facility at the U.S. Olympic Training Center uses two Apple II Plus personal computers, and a Gould personal computer for medical diagnostics, to aid in testing athletes' strength.

In the sports physiology lab, subjects are strapped into a special chair and told to push against a lever arm with all their might. The Apples monitor the force exerted by the athlete, and then record the measured strength and range of motion of the various muscle groups. Shoulders, hips, knees and ankles can all be tested, says Dr. Jackie Puhl, sports physiologist at the center. Using the computer to analyze and record the data, "saves us hours and hours of work."

"It's a quicker way to get information and keep track of it," says Bob Hintermeister, research assistant at the lab. "The whole purpose is to do functional testing and try to educate people."

According to Puhl, the athletes go through the same tests as they did in precomputer days, but the information now goes straight from the testing mechanism into the computer for

analysis, bypassing the time-consuming calculations the department's staff once had to perform.

Processing the data before the lab bought the personal computers was laborious. "We'd have hundreds of these little curves to measure," Puhl says, "and we had to take a measuring stick and measure each curve on each graph by hand. It took hours. Now it takes about 10 seconds."

Bicycles, rowing machines, treadmills for running, and arm cranking (used for canoers or kayakers), are just a few of the machines used for testing. And different types of athletes go through different tests. "Weightlifters," Puhl says, "don't care about aerobic capacity. We test them for strength."

The test results go straight into the computer, which then calculates the amount of oxygen an athlete's body is using, the amount of carbon dioxide exhaled, and respiratory and heart rates—information coaches, athletes and the sports medicine staff can eventually combine to develop more effective training programs.


A nutrition program is currently in the works which will ask athletes what they've been eating, so the computer can devise an improved diet to better meet their body's needs.

To take the benefits of computer testing beyond the training center, the sports physiology department has equipped a 26-foot van with an Apple computer. The van travels throughout the U.S. three or four times a year, visiting and testing athletes who can't make it to Colorado. Staff members visit the sites of championship meets and races to test many athletes at one time, Puhl says. Last year, for example, the van traveled to the Potomac River in Washington, D.C., to test kayakers.

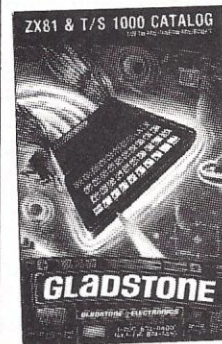
From swimmers to archers, cyclists to wrestlers, athletes have responded positively to the use of the computers in physical testing. "It's the same machinery they've always been tested on," Puhl says. "They just get a lot

faster feedback (since it's hooked up to a computer). It's nice to see the information on the screen as you're being tested." Puhl says the equipment has proven so helpful that a third Apple has been ordered.

The physiology department also uses its personal computers for word processing, statistical work, and storing lists of companies it deals with. But it is the ease with which the department can test athletes which has really won Puhl over.

"As we get closer to the 1984 Games, we expect to be testing many more athletes," Puhl says. And that's when the speed of computerized calculations will really come into play, with the ability to give athletes "nearly immediate feedback." 

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4 DAYYEAR	Day of year a particular date falls on	62 MERGNAT	Merger analysis computations
5 LEASEINT	Interest rate on lease	63 FINRAT	Financial ratios for a firm
6 BREAKVEN	Breakeven analysis	64 NPV	Net present value of project
7 DEPRSL	Straightline depreciation	65 PRINDLAS	Laspeyres price index
8 DEPRSY	Sum of the digits depreciation	66 PRINDPA	Paasche price index
9 DEPRDB	Declining balance depreciation	67 SEASIND	Constructs seasonal quantity indices for company
10 DEPRDDB	Double declining balance depreciation	68 TIMETR	Time series analysis linear trend
11 TAXDEP	Cash flow vs. depreciation tables	69 TIMEMOV	Time series analysis moving average trend
12 CHECK2	Prints NEBS checks along with daily register	70 FUPRINF	Future price estimation with inflation
13 CHECKBK1	Checkbook maintenance program	71 MAILPAC	Mailing list system
14 MORTGAGE/A	Mortgage amortization table	72 LETWRT	Letter writing system-links with MAILPAC
15 MULTMON	Computes time needed for money to double, triple, etc.	73 SORT3	Sorts list of names
16 SALVAGE	Determines salvage value of an investment	74 LABEL1	Shipping label maker
17 RRVARIN	Rate of return on investment with variable inflows	75 LABEL2	Name label maker
18 RRCONST	Rate of return on investment with constant inflows	76 BUSBUD	DOVE business bookkeeping system
19 EFFECT	Effective interest rate of a loan	77 TIMECLCK	Computes weeks total hours from timeclock info.
20 FVAL	Future value of an investment (compound interest)	78 ACCTPAY	In memory accounts payable system-storage permitted
21 PVAL	Present value of a future amount	79 INVOICE	Generate invoice on screen and print on printer
22 LOANPAY	Amount of payment on a loan	80 INVENT2	In memory inventory control system
23 REGWITH	Equal withdrawals from investment to leave 0 over	81 TELDIR	Computerized telephone directory
24 SIMPDISK	Simple discount analysis	82 TIMUSAN	Time use analysis
25 DATEVAL	Equivalent & nonequivalent dated values for oblig.	83 ASSIGN	Use of assignment algorithm for optimal job assign.
26 ANNUEDEF	Present value of deferred annuities	84 ACCTREC	In memory accounts receivable system-storage ok
27 MARKUP	% Markup analysis for items	85 TERMSPAY	Compares 3 methods of repayment of loans
28 SINKFUND	Sinking fund amortization program	86 PAYNET	Computes gross pay required for given net
29 BONDVAL	Value of a bond	87 SELLPR	Computes selling price for given after tax amount
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On Women Who Buy And Use Computers

I read with disbelief your interview with Atari's John Cavalier on page 119 of the April issue. Cavalier asserts that Atari "understands the consumer," but then goes on to prove that he, at least, does not understand the consumer.

Cavalier refers to 25- to 49-year-old males who are exposed to computers at the office. Apparently he is unaware of how many women are exposed to computers in the office. Many of these women use computers in their clerical and secretarial jobs. However, Cavalier does not know of the existence of these people, and speaks instead of housewives "buying computers out of their grocery money" to help their children.

I am a practicing attorney and have spent thousands of dollars on computer equipment for my office and home. While it would please me if the computer in my home benefited my children, the machine (an Atari, incidentally) was not bought solely for that purpose. And it certainly was not bought out of my "grocery money." If your interview reflects Cavalier's understanding of the consumer, he should stick to Dixie Cups. At least they are bought out of the grocery money.

Margery E. Golant
GOLANT AND GOLANT
ATTORNEYS AND COUNSELORS AT LAW
TOWANDA, PA

"Hayden's *Personal Computing* magazine's accuracy policy: to make diligent efforts to insure the accuracy of editorial material. To publish prompt corrections whenever inaccuracies are brought to our attention. Corrections appear in 'Letters.' To encourage our readers as responsible members of our business community to report to us misleading or fraudulent advertising. To refuse any advertisement deemed to be misleading or fraudulent."

CAN I COPY THIS SOFTWARE?

I was very pleased to see your article in the May 1983 issue, page 131, titled "Copying Computer Software: What Risks, What Penalties?" which was prepared in consultation with Mr. Daniel Brooks.

I am a staff attorney for the Defense Mapping Agency Aerospace Center, a government entity involved in the production of maps and charts. Because of the sophisticated nature of the agency's product, we have thousands of employees utilizing every imaginable piece of computer equipment, from the Apple II to the most advanced Sperry Univac. One of the questions most frequently asked of this office is: "Can I copy this software?"

Paul C. Kelbaugh
STAFF ATTORNEY
DMA AEROSPACE CENTER/CO
ST. LOUIS AFS, MO

EDITORIAL REVISIONS

I read with interest your April 1983 editorial "Revisions, Revisions," page 5. The piece was a succinct allusion to the ways in which computer-based word processing changes the relationship between authors and their work.

However, I have a slight quibble with your choice of characterizations. You say that the strengths of mainframes lie in their ability to manage huge data bases and crunch complex strings of numbers quickly. You then contrast these machines with personal computers which can be tailored to individual, personal needs. My quibble is with two facets of that comparison: 1) that mainframes are not used in ways that provide individualized, personalized service; 2) that there is some sort of adversarial dichotomy between mainframes and personal computers.

Speaking as a mainframe programmer and system designer since 1966, and a personal-computer user since 1980, I don't think it's useful or productive for us to teach people to disdain each other be-

cause of the size of their computers. In my work, I try to learn how to benefit in one realm from what I learn in the other.

The personal computer today is as computationally powerful as computers that only 15 years ago were characterized as medium-size. In those days many of the computers were also used to do only one thing (a batch job) at a time. The personal computer and its uses seem to be evolving along some of the same lines that larger systems experienced. Personal computers and mainframes have uses for each other, and many people who use one also use the other.

It is true that large systems have their faults, as do the current crop of personal systems. However, it is no service to anyone for us to talk about personal and large systems using a vocabulary of animosity or ignorance. Large systems have already solved many problems that personals have yet to encounter, and personal systems have addressed areas of computational accessibility that large systems have not adequately dealt with.

We must recognize the need to stand on each others' shoulders rather than to kick each others' shins.

Elie Cassorla
CROTON-HUDSON, NY

CONVERTING YOUR TYPEWRITER

Your "Answers" editor apparently overlooked us when he couldn't find a source of printer conversion interfaces for electric typewriters (March 1983 issue, page 12). For several years our company has been selling a printer conversion interface for the IBM Selectric typewriter, and sees a continuing strong demand for the product.

Our interface installs inside the typewriter and operates the print ball mechanism with no modification to the typewriter. This leaves the keyboard accessible for normal typing. The Selectric mechanism is rugged and dependable, and suffers no reliability problems from this conversion. IBM approved the inter-

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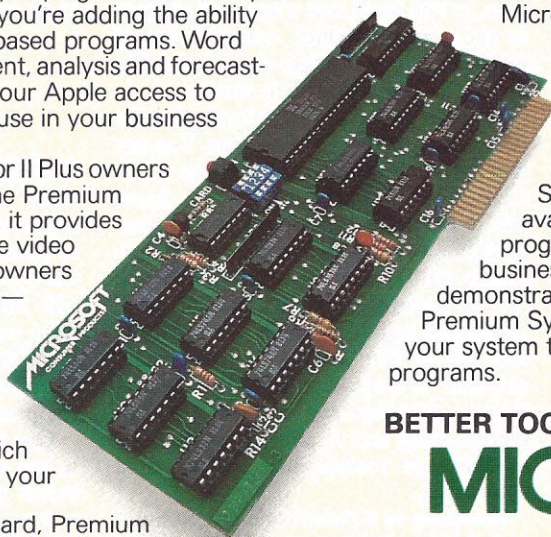
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Bill Meisenheimer
VICE PRESIDENT
IPEX INTERNATIONAL INC.
CALABASAS, CA

A POSTSCRIPT TO SUB- AND SUPERSCRIPTS

In your April 1983 "Answers" column, page 23, one of your readers wanted to know how to use WordStar and an Epson MX-100 to print sub- and superscripts with his Xerox 820. I own a copy of WordStar which I use with an Apple II and an Epson MX-80, and I believe the information you gave this person was partially incorrect and partially incomplete.

The person who asked the question may be using three different types of printers: an MX-100 without Graphtrax, an MX-100 with Graphtrax, or an MX-100 with Graphtrax Plus. In all cases, he should be able to get sub- and superscripts. The easiest way is to write double-spaced papers so WordStar can put the characters on the blank line above or below the text. This is what I did until I discovered how to direct WordStar to advance the paper a half line.

If the printer has the old Graphtrax, put in the following patch, which tells WordStar how to send a carriage return and a half line feed to the printer:

Address	Contents
6A8	7
6A9	1B
6AA	33
6AB	12
6AC	D
6AD	A
6AE	1B
6AF	32

WordStar will then print full-size characters a half line above or below the line to text. If the printer doesn't have any version of Graphtrax, the patch would contain slightly different information in the same location. This is because Epson altered the command that changes the line spacing when it introduced Graphtrax. If the printer has Graphtrax Plus, a

different patch would be used—one that I'm not familiar with because I don't know how the command is sent.

As for your suggestion to run WordStar's configuration module, there are no questions in the INSTALL program which ask if the printer can sub- and superscript. My INSTALL program doesn't ask, and I'm almost positive that MicroPro hasn't come out with a new version of WordStar that does. The only questions pertaining to a printer that are asked in the INSTALL program are: Is the printer a teletype printer, is it a teletype printer that can backspace, or is it one in a list of daisywheel printers?

More information on this topic can be obtained from Appendix F (the printer patch area) of the WordStar manual, and from the printer manual. Using both of these guides, you'll be able to get the printer to do all kinds of tricks.

Larry Seltzer
MEDFORD, MA

AN UPDATE ON COMPUTING YOUR FAMILY TREE

In your March 1983 issue, page 9, you printed a letter I wrote in reference to your January article "Computing Your Family Tree." The letter described how I solved the problem of managing data accumulated from tracing my family tree—I found a book in the Oregon State Library titled with a family name, and in fine print after the title was a line that labeled the work a compendium. The compendium format interested me, so I made modifications to it and eventually printed what I call an "INDEX" of my family.

The article in your January issue concerning the management of such large amounts of correspondence and facts posed a problem which I thought my experience would solve. Unfortunately, my response proved to be a burden, because I have had letters forwarded to me by the Oregon State Library, from your own office, and I've received many calls and letters from people across the United States who had no trouble finding my address and phone number.

My solution to the original problem is one of simplified data retrieval. It lies in an alphabetical listing of every member of the family with a code consisting of the first letter of the family name and the

number representing the generation FROM AN ARBITRARILY SELECTED ANCESTOR. In this system my own entry is:

DAVIS, JOHN EDWARD D-8

If the entry contains all the pertinent data from one individual, you can go through an "INDEX" of entries and do all the usual tasks such as personal and vital statistics, editing, and adding historical material. In the end, the printer can spew out a pedigree, or a complete family index. But the printer must be able to handle the required number of characters for the longest name, and you must know the code needed to make the system work. I asked the people at Radio Shack if their TRS-80 will do the job, and they say the machine will handle a 36-character string.

Our family "INDEX" is in the state libraries of Oregon, Washington, Missouri, and West Virginia. It is also in the DAR library and the Library of Congress. It is not under copyright. The title is: The Legend of the Lyons Family who are descended from William Lyons, 4th Penn Vols. By John E. Davis and Thomas P. Evans Jr.

I hope this letter contains material which will bring a halt to this stream of correspondence.

John E. Davis
SALEM, OR

MIXING BIRDS AND COMPUTERS

I read many computer magazines, but *Personal Computing* is my favorite. I'm hoping you will inform your readers about our organization.

The Newburyport Birders' Exchange (NBE) is an organization of individuals interested in both birds and personal computers. Our philosophy is that biology and technology can have a symbiotic relationship. The personal computer is a wonderful tool which can assist the birder in organizing and analyzing birding data, and we encourage birders to share information about this activity. As our membership grows, we hope to be able to investigate the possibilities of sharing programs and possibly talking via modems.

Thank you for your consideration.

Edward M. Mair
PRESIDENT
NEWBURYPORT BIRDERS' ASSOCIATION
NEWBURYPORT, MA



Quark introduces

A deceptively simple solution to your word processing dilemma.

If you're serious about word processing on your Apple*IIe, you may be bewildered by the sheer number of programs available. And a tad perplexed by their claims and promises. After all, a glamorous package that says "easy to use," may not even be easy to open.

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Word Juggler™ IIe.

you need to print only specific pages, multiple copies, or even documents too large to fit in memory, Word Juggler IIe can easily accommodate you.

A clever way to foil Mr. Murphy.

Even the best of us occasionally forgets when "i" does not come before "e" — and even the most agile fingers can press the wrong key. So you should also give serious consideration to Quark's new Lexicheck™ IIe — a spelling checker with a highly compressed, 50,000 word dictionary.

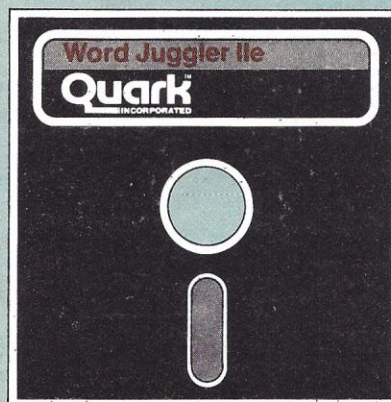
Accessed from within the word processor, this program lets you virtually eliminate typographical errors and common misspellings. Lexicheck IIe will scan your document at up to 8,000 wpm — then highlight, in context, the first occurrence of any word it does not recognize.

If the word is correct, as in the case of industry jargon or abbreviations, you can simply add it to your personal dictionary. If the word is actually misspelled, you can swiftly correct it.

A lot more.

These are only some of the ways Word Juggler IIe and Lexicheck IIe can help solve your word processing dilemma. Your Quark dealer has even more details, as well as complete information on our line of office automation tools for the Apple III.

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other home computers can't. Including some of those that cost a lot more. (Take another look at the three computers above.)

By itself, the Commodore 64 is all the computer you'll ever need. Yet, if you do want to expand its capabilities some day, you can do so by adding a full complement of Commodore peripherals. Such as disk drives. Modems. And printers.

You can also play terrific games on the Commodore 64. Many of which

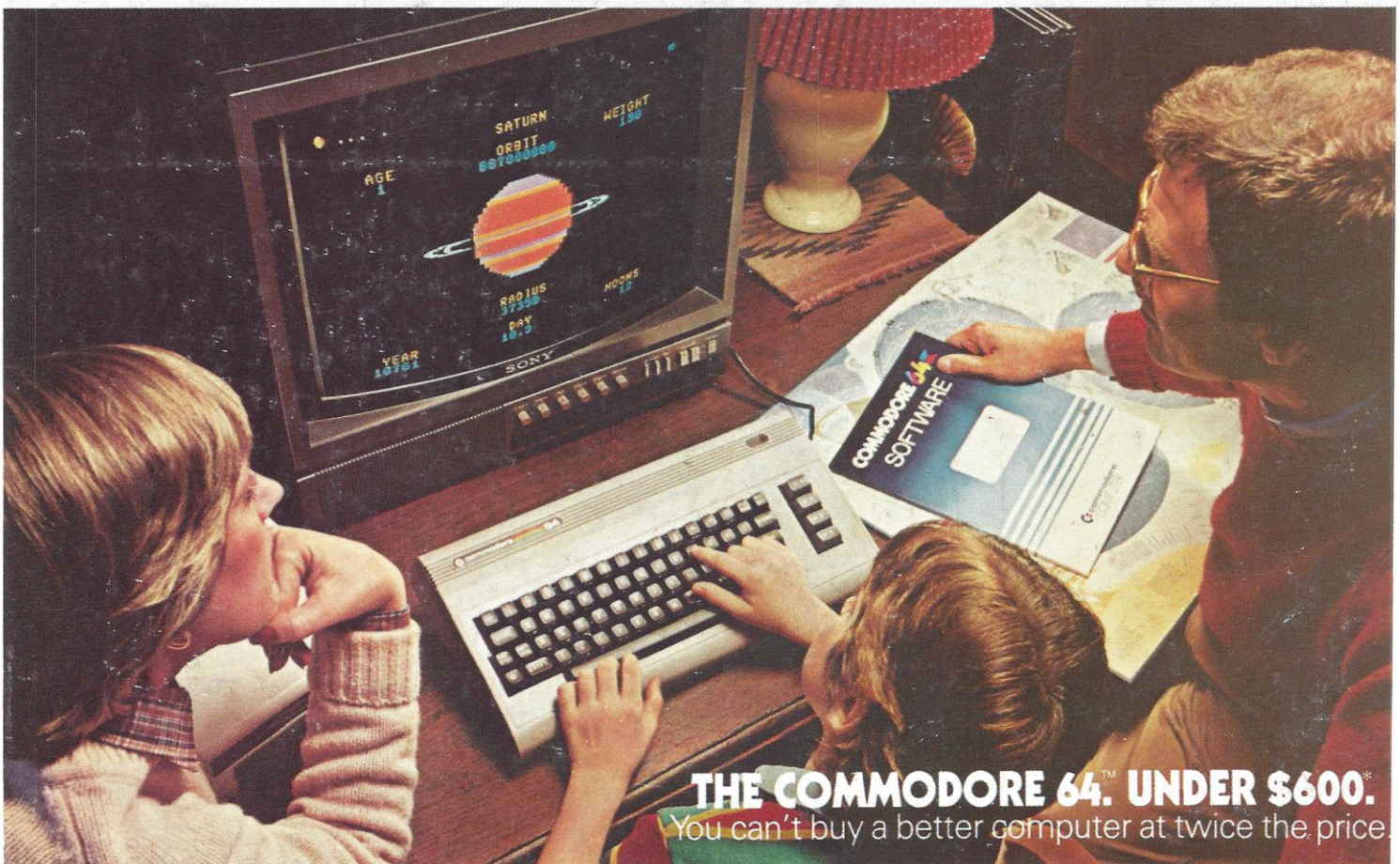
will be far more challenging than those you could ever play on a game machine alone. And as great as all this sounds, what's even greater-sounding

is the price. It's hundreds of dollars less than that of our nearest competitor.

So while other companies are trying to take advantage of the computer revolution, it seems to us they're really taking advantage of something else: Their customers.

*Manufacturers' suggested list prices as of March 20, 1983. Monitor included with TRS-80 III only. Commodore Business Machines, P.O. Box 500R, Conshohocken, PA 19428; Canada—3370 Pharmacy Avenue, Agincourt, Ont., Can. M1W 2K4.

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